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**(54) COMPOSITE CLOSURE AND METHOD OF MAKING SAME**

ZUSAMMENGESETZTER VERSCHLUSS UND VERFAHREN ZU DESSEN HERSTELLUNG  
FERMETURE COMPOSITE ET SON PROCEDE DE PRODUCTION

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## Description

[0001] The present invention relates in general to new and useful improvements in closure caps for glass and plastic containers and to a method of making the same and, more particularly, to an improved composite closure having a preformed end panel member around which a plastic skirt is molded. In this regard, an important aspect of the present invention is directed to an improved composite closure cap which includes a preformed metal end panel member around which both a plastic skirt and gasket are molded. The closure cap can also include a tamper indicating band which, in a preferred embodiment, is integral to and simultaneously molded with the skirt and has a foldable configuration designed to provide enhanced integrity of the frangible bridges, both during formation of the skirt and band and also during application of the closure to a container.

[0002] Composite closures having tamper indicating features are well known in the prior art and have been commonly used for a wide variety of products including, for example, baby food products and preserves, which are either hot-filled or are thermally pasteurized or sterilized after filling and closing. Typically, these closures include a metal panel which is prelined with a plastisol gasket material and inserted or pressed into a preformed plastic (e.g. polypropylene) skirt. A tamper indicating band, typically formed of a plastic material, is commonly secured to the lower portion of the skirt by a mechanical interlock which typically involves separate formation and assembly steps.

[0003] PT versions of these closures (i.e. those enabling press-on or non-rotary application to a container but requiring rotational removal) are commonly lined with a conventional plastisol gasket compound that is arranged, to be in sealing engagement with the top edge or finish of the container and along the neck portion thereof. When first formed, these liners have a cylindrical bore which is adapted to provide an interference fit with the screw thread on the container neck, thereby enabling closure to be directly applied to the container without requiring rotation thereof. During thermal processing of the container after the filling and capping thereof, this lining takes a set by which it permanently conforms to the container's helical thread(s) for subsequent rotational removal of the closure by the user.

[0004] One such prior art closure is shown in U.S. Patent No. 5,190,177. The closure cap of this patent includes a metal shell having a skirt portion which extends into a free edge formed by an in-turned curl at the end of the skirt. A separately formed plastic tamper band at its upper end is provided with an enlarged annular top portion that is held captive by a mechanical interlock with the terminal portion of the metal skirt.

[0005] US-A-3913771 discloses a closure cap with a tamper indicating band. The cap comprises a disc-like metal cover contained in an outer plastic ring. The outer plastic ring includes a skirt portion for engaging with a

container.

The tamper indicating band is formed with its upper edge lightly attached to the skirt portion by small frangible bridges.

[0006] While prior art composite closures have provided satisfactory container sealing properties, some have been characterized by multiple manufacturing steps for individual components thereof, separate assembly steps and, in some instances, further processing of one or more components in order to provide the desired mechanical interlock to the tamper band.

[0007] The present invention overcomes the problems and disadvantages of the prior art closures by providing a composite closure comprising a metal end panel member having a central portion sized and positioned to overlie a mouth of a container to which said closure is applied, said container mouth being defined by a generally cylindrical neck portion, said end panel member having an upper surface and a lower surface and extending into a free edge at a peripheral portion thereof, said peripheral portion including an inner surface and an outer surface adjacent to said free edge, a generally cylindrical plastic skirt molded in surrounding and capturing relation to said end panel with at least a part of said central portion being free of plastic, a gasket within said closure, said gasket being engageable with said neck portion of said container to provide a seal therewith, said free edge of said end panel and the inner and outer surfaces of said peripheral portion being entirely covered by contact with at least one of said gasket and said plastic skirt.

[0008] The gasket, preferably of a side seal type and composed of a thermoplastic elastomer can be formed by molding the same simultaneously with the molding of the skirt or, depending upon configuration of the end panel or shell and skirt, either prior to, or after molding of the skirt.

[0009] In accordance with an important aspect of this invention, the interior of the skirt includes preformed threads which are preferably of a multiple-lead configuration. Due to the flexibility of the skirt, these preformed threads will readily slide over the threaded portion of a container neck, enabling press-on or non-rotary, axial application of the closure to the container but which, at the same time, require rotational removal thereof. In some instances, a limited rotational twist or cinching after such axial application may be utilized to effect the desired sealing of the container.

[0010] An integral tamper indicating band extends downwardly from the lower portion of the skirt and can be formed by selectively slitting the bottom portion of the skirt to define a plurality of frangible bridges or, alternatively, by the formation of such bridges during the molding operation. In accordance with a further important aspect of the present invention, the band can include an upper portion joined to the skirt by a plurality of circumferentially disposed frangible bridges and a lower portion hingedly connected to said upper portion. The lower

portion of the band has an axial length greater than the upper band portion so that when the closure is applied to a container, the bottom end of the lower band portion extends radially inwardly and axially upwardly for engagement with a retainer bead on the container at a location above the circumferentially disposed frangible bridges. In this manner, premature or inadvertent rupturing of the bridges is avoided both during the formation of the band (machine folding thereof) and also during application of the closure to a container.

[0011] It is, therefore, a general object of the present invention to provide a new and improved composite closure cap and method of making the same.

[0012] Another object of the present invention is to provide a novel composite closure cap having a metal end panel and a plastic skirt wherein the skirt is molded in surrounding and capturing relation to the end panel with a central portion of said end panel being exposed or free of plastic.

[0013] Another object of the present invention is to provide a novel composite closure wherein in one embodiment both a plastic skirt and gasket are molded around a preformed metal end panel.

[0014] Another object of the present invention is to provide a novel composite closure having an injection molded skirt with preformed threads therein, which skirt is sufficiently flexible to permit direct axial and nonrotating application of the closure to a container during the filling and capping of the container but which requires twisting or rotational action for removal of the closure from the container.

[0015] Another object of the present invention is to provide a novel PT closure having a metal top panel around which a skirt and integrally formed tamper indicating band are molded.

[0016] Another object of the present invention is to provide an improved foldable tamper-indicating band that is designed to minimize, if not totally avoid, inadvertent rupturing of the frangible bridges interconnecting the band to the bottom of a plastic skirt on a closure cap.

[0017] Another object of the present invention is to provide an improved composite closure having an end panel member formed of metal to which a generally cylindrical plastic skirt is molded in surrounding and capturing relation therewith wherein corrosion of the free edge of the end panel member is prevented by encapsulating the same within at least one of a gasket or said molded plastic skirt.

[0018] Another object of the present invention is to provide an improved composite closure having an end panel member to which a plastic skirt is molded in surrounding and capturing relation wherein the free edge of the terminal portion of the end panel is encapsulated between said plastic skirt and a molded gasket.

[0019] Another object of the present invention is to provide an improved composite closure exhibiting improved top impact resistance.

[0020] Another object of the present invention is to

provide an improved composite closure exhibiting improved side impact resistance.

[0021] Another object of the present invention is to provide an improved composite closure having a metal end panel and a plastic skirt formed by molding the same in surrounding and capturing relationship therewith and an in-situ molded gasket which, upon application of said closure to a container, will move in an axially downwardly direction to provide an improved side seal with the outer surface of the neck portion of said container.

[0022] Another object of the present invention is to provide an improved composite closure having a gasket configuration which includes an upper end portion that terminates outwardly of the end surface of a container finish whereby migration of contaminants through the gasket to the contents of the container is minimized.

[0023] These and other objects of the present invention will be apparent from the following detailed description taken in conjunction with the accompanying drawings wherein like reference numerals refer to like parts and in which:

Fig. 1 is an elevational view of a composite closure in accordance with one embodiment of the present invention showing the details of the exterior skirt and tamper indicating band;

Fig. 2 is a top plan view of the closure shown in Fig. 1;

Fig. 3 is a partial side view of the interior of the closure cap shown in Figs. 1 and 2 illustrating the multiple-lead preformed threads in the skirt portion thereof;

Fig. 4 is a vertical sectional view illustrating the closure of Figs. 1-3 as formed and prior to the application of said closure cap to a container;

Fig. 5 is a vertical sectional view similar to Fig. 4 but showing the closure cap as applied to a container prior to the creation of a vacuum condition in said container;

Fig. 6 is a view similar to Fig. 5 but showing the axial spacing between the upper annular flange of the skirt and the portion of the metal end panel underlying the same after the creation of a vacuum condition in the container;

Fig. 7 is a fragmentary perspective of the plastic skirt of Figs. 1-6 showing the tamper indicating band thereof in its molded position;

Fig. 8 is a bottom end view of the closure cap shown in Figs. 1-6;

Fig. 9 is a sectional view taken along the line 9-9 of the closure cap shown in Fig. 1;

Fig. 10 is a fragmentary sectional view showing the tamper indicating band of the present invention as applied to a container and also illustrating, in phantom lower band travel during manufacturing process;

Fig. 11 is a schematic view of a dual station mold

showing the upper and lower components thereof in an open position;

Fig. 12 is a schematic view of the dual station mold shown in Fig. 11 with the upper and lower components thereof in a closed position illustrating the formation of a gasket in the end panel of a closure in accordance with one aspect of the present invention;

Fig. 13 is a schematic view of the dual station mold shown in Figs. 11 and 12 illustrating the formation of a skirt in surrounding and capturing relation to the end panel and gasket of the closure;

Fig. 14 is a schematic view like that shown in Figs. 11-13 with the mold components separated showing the ejection of a finished closure;

Fig. 15 is an exploded perspective view of a composite lug closure embodying the present invention as seen in relation to the neck of a glass container of a food product to which the closure is fitted;

Fig. 16 is a top plan view of the closure shown in Fig. 15;

Fig. 17 is a sectional view taken along the line 17-17 of Fig. 16;

Fig. 18 is an exploded perspective view like that of Fig. 15 showing another embodiment of a composite closure of the present invention;

Fig. 19 is a top plan view of the closure shown in Fig. 18;

Fig. 20 is a sectional view taken along the line 20-20 of Fig. 19;

Fig. 21 is an exploded perspective view like Figs. 15 and 18 showing a further embodiment of a composite closure of the present invention;

Fig. 22 is a top plan view of the closure shown in Fig. 21;

Fig. 23 is a sectional view taken along the line 23-23 of Fig. 22;

Fig. 24 is an exploded perspective view like Figs. 15, 18 and 21 showing a composite closure in accordance with a still further embodiment to the present invention;

Fig. 25 is a top plan view of the closure shown in Fig. 24;

Fig. 26 is a sectional view taken along the line 26-26 of Fig. 25;

Fig. 27 is an exploded perspective view like Figs. 15, 18, 21 and 24 showing a composite closure in accordance with a yet further embodiment of the present invention;

Fig. 28 is a top plan view of the closure shown in Fig. 27; and,

Fig. 29 is a sectional view taken along the line 29-29 of Fig. 28.

[0024] Referring to the drawings and with particular reference to Figs. 1-10, a composite closure cap embodying the present invention is generally designated by the reference number 10. As shown, closure cap 10

includes a plastic skirt 11, an end panel member 12, a tamper indicating band 13 integrally formed with the skirt 11, and a gasket 14.

[0025] End panel 12 is formed of metal. As best shown in Figs. 4-6, end panel member 12 in the illustrated embodiment includes a central portion 16, the radial innermost portion of which includes an upwardly projecting button 17 which sequentially extends radially outwardly into a downwardly and outwardly inclined flange 18, a flat 19, an upwardly and outwardly inclined flange 21, annular flat 22, a downwardly and radially outwardly inclined flange 23, a radially extending annular flat 24, a downwardly curved section 26 and a radially and axially downwardly extending section 27 which terminates in a free or cut edge 28. As is known in the art, the creation of a vacuum condition in the container to which the closure is applied will result in the downward axial movement and depression of the panel and button 17 while release of the vacuum will cause the panel and button to return to their as-formed position shown in Fig. 4.

[0026] In the illustrated embodiment, plastic skirt 11 includes an upper radially inwardly extending flange 29 which overlies the outer periphery of the end panel member and extends axially downwardly into a sidewall 31 the inner circumferential surface of which is provided with a plurality of preformed threads 32 and from there into an enlarged axially downwardly extending cylindrical section 33, the terminal portion 34 of which is integrally connected to tamper band 13 by means of a plurality of circumferentially disposed fractureable bridges 36. A plurality of drain holes 37 can be provided for facilitating the discharge of moisture during the processing of a container to which the closure cap has been applied.

[0027] In accordance with an important aspect of this invention, skirt 11 is formed by molding the same in surrounding and capturing relation to the end panel member 12 in a manner by which the central portion of the end panel member 12 is exposed, that is free of any overlying plastic material. Any suitable molding technique such as insert injection molding, which permits the formation of the skirt in this surrounding and capturing relation to end panel 12, can be employed. The skirt 11 can be suitably formed from any thermoplastic or thermoset resin, however, homopolymers, copolymers and terpolymers of ethylene and/or propylene are generally preferred with polypropylene being especially preferred.

[0028] In accordance with a further important aspect of the present invention, gasket 14 is of a side seal type and is also formed by molding. Gasket 14 can be formed of any resilient or elastomeric materials (i.e. thermoplastic, thermoset and plastisol compositions) which provide the desired seal with the finish of a container. In this regard, however, vinyl chloride-free resins or non-PVC materials are preferred.

[0029] These non-PVC materials include rubbery block copolymers dispersed in a matrix of polyolefin as

a continuous phase with moldable thermoplastic elastomers being especially preferred since they possess a number of processing advantages and can be used with little or no extra compounding, vulcanization or heating steps. For example, gasket compositions composed of a thermoplastic elastomeric material selected from a moldable, saturated ABA type block copolymers based on styrene and butadiene such as styrene-ethylene-butylene-styrene (SEBS) type block copolymers containing from about 20% to about 40% styrene and 60% to 80% ethylene-butylene co-monomers, such as Kraton® G-2705 available from Shell Chemical Corporation, can be effectively used. Preferred thermoplastic elastomers include the EPDM (ethylene-propylene-dicyclopentadiene) elastomers such as those commercially available under the trade name Santoprene® from Monsanto Company. If desired, suitable additives to facilitate torque release and other beneficial properties can be used in these gasket compositions.

**[0030]** As best shown in Figs. 5 and 6, when the closure cap of this embodiment is applied to a container 38 having an end surface 39 and a neck 41 with external thread 32a, the gasket will primarily provide a side seal. In this regard, it will be noted that gasket 14 includes an upper annular flange which extends radially inwardly over only a limited portion of the end surface 39. As such, migration of contaminants through the gasket to product contained within the container 38 is minimized, if not totally eliminated.

**[0031]** In accordance with an important aspect of the present invention, the free end or cut edge 28 of end panel member 12, is encapsulated. For example, in the illustrated embodiment, cut edge 28 is encapsulated between the gasket 14 and molded plastic skirt 11. As will be observed with other embodiments of the present invention, however, the cut edge 28 optionally can be encapsulated entirely within the gasket 14 or entirely within the plastic skirt 11. All of these arrangements provide the desired corrosion prevention of the free end or cut edge.

**[0032]** Closure caps of the present invention also exhibit important and beneficial impact resistance to axial and radial forces which may be applied to the container during handling, warehousing, stacking and the like. This resistance to axially applied forces is best illustrated by referring to Figs. 5 and 6. As shown, the annular flange portion 29 of skirt 11 extends over the outer periphery of the end panel member and terminates at a location adjacent the stacking panel radius of the closure. Prior to the formation of a vacuum in the container 38 as depicted by Fig. 5, the lower portion of flange 29 is in direct contact with the upper portion of the metal end panel underlying the same. Since there is very little, if any, adhesion or bonding between the bottom surface of that flange and the metal panel, however, the creation of a vacuum in container 38 results in the downward axial travel of the end panel to provide a spaced-away relationship between that flange portion and the upper sur-

face of the panel as is generally designated by the reference numeral 42 in Fig. 6. In this manner, the inherent resiliency of the flange 29 enables it to function as a shock-absorbing member with substantially reduced transmission of axial forces to the end panel, such forces being directed to the sidewall 31 of the skirt. This axial shock absorbing advantage is further enhanced by the presence of an axial gap or space 43 between the lower surface of the outer periphery of the end panel which overlies the end surface 39 of the container as also shown in Fig. 6. Accordingly, unlike conventional side seal closures wherein there is a metal to glass contact, this panel to end surface axial spacing further enhances the transfer of axially imparted forces through the gasket to the exteriorly located plastic skirt, thereby resulting in the distribution of such forces around the periphery of the closure and minimizing leakage caused by such axial forces.

**[0033]** In accordance with a still further aspect of the present invention, gasket 14 (when composed of a thermoplastic elastomer), will have a substantially stronger bond to the plastic skirt portions which are in contact therewith than is present between the gasket and the metal portion of the end panel. Since the thermoplastic elastomer gasket, while resilient, is relatively non-compressible in comparison to a gasket of a foamed or puffed plastic, application of the closure cap to a container results in a movement of the gasket in axially upward and downward directions, thereby providing an enhanced side seal with the outer surface of the neck portion 41. If desired, the bond or adhesion between the thermoplastic gasket and the metal disk can be increased by preheating the metal disk or applying an adhesion-enhancing coating thereto.

**[0034]** Referring now to Figs. 1 and 7-10, the tamper indicating band 13 is shown to include an upper portion 44 hingedly connected at 46 to a lower band portion 47. The lower band portion 47 is, in accordance with a preferred embodiment, defined by a plurality of individual separate band segments 47a, 47b, 47c and 47d. If desired, washout apertures 48 between the terminal edge portion of skirt 11 and the upper portion band 44 can be provided for passage of moisture and liquids into the space between the interior of the skirt and the container neck.

**[0035]** As best shown in Fig. 10, the upper portion 44 of the tamper indicating band is joined to the skirt by the bridges 36 at a location below a container retainer bead 49. In accordance with a further and preferred aspect of the present invention, the axial length of the lower band portion 47 (47b in the portion shown in Fig. 10) is greater than the axial length of the upper band portion 44. In this manner, when the closure is applied to a container, the terminal portion 50 of the lower band 47 extends radially inwardly and axially upwardly for engagement with the retainer bead 49 at a location above the circumferentially disposed bridges 36. The tamper band 13 thereby provides enhanced integrity of the frangible bridges and

inadvertent rupturing thereof is minimized, if not totally avoided, both during the formation of the band (i.e. machine folding thereof) and also during application of the closure to a container.

[0036] While the improved tamper band of the present invention is shown and described in association with the improved composite closure of this invention wherein a plastic skirt is molded in surrounding and capturing relation to an end panel, it will be appreciated that the advantageous enhanced bridge integrity achievable therewith can likewise be suitably employed in other closures such as, for example, those shown in co-owned U.S. Patent No. 4,981,230 which describes and claims a composite plastisol-lined metal and plastic closure having a metal shell that includes a skirt, the end portion of which is provided with an outward curl that is secured to and received within a plastic overcap. Accordingly, it will be appreciated that the benefits and advantages of the tamper indicating band feature of this invention can find suitable application to a variety of other composite closure caps as well as closure caps having a unitary top and sidewall skirt formed entirely of plastic.

[0037] Correspondingly, it should also be noted that the closure caps embodying the previously-described novel skirt molding feature of the present invention can incorporate integral tamper bands having a lower band portion 47 with a terminal portion 50 which is at the same elevation as, or below, the frangible bridges 36. Alternatively, if desired, the tamper band can be eliminated in its entirety or a tamper band having a configuration other than that shown in Figs. 1-10 used in-place thereof.

[0038] The closure shown in Figs. 1-10 can be manufactured by a variety of molding procedures which achieve the desired formation of a plastic skirt in surrounding and capturing relation to a preformed end panel or disk. For example, these closures can be manufactured by insert injection procedures as well as other molding procedures and techniques apparent to those skilled in this art.

[0039] A suitable procedure for manufacture of these closures is illustrated by the sequential steps shown in Figs. 11-14 which generally depict a two-stage process wherein the gasket is insert molded to the disk in a first station followed by molding of the plastic skirt to the end panel and gasket in a second station. If desired, however, the gasket can be separately formed and inserted into a previously formed partial closure (i.e. one including only the end panel and molded skirt). It will also be appreciated that, depending upon the configuration of the individual components of these closures, the gasket may be molded simultaneously with, or subsequently to, the molding of the skirt.

[0040] Referring to Figs. 11-14, the reference numeral 60 generally designates an injection molding apparatus which includes an upper mold component 61 which includes a first cavity 62 and a second cavity 63. A lower mold component 64 is also provided and includes first and second members 65 and 66 which are moveable

as a unit for alignment of a core 67 carried by member 66 into appropriate registration with each of the cavities 62 and 63. Lower mold member 64 is adapted to slidably travel along a base member 68 which includes a knock-out piston or cylinder 71 for ejection of the finished closure.

[0041] First cavity 62 is supplied with melt suitable for forming the gasket 14 of the closure via a melt supply chamber 69 and gate 70. A poppet 72 can be provided in cavity 62 for ensuring transfer of the partially formed closure from the first station (cavity 62) to the second molding station (cavity 63). Cavity 63 is supplied with a melt suitable for forming the skirt 11 from a melt supply chamber 73 which feeds a gate 74 for discharge of the melt into the cavity 63. Knockout cylinder or piston 71, in association with telescoping actuating cylinders 76 and 77, effects separation of mold parts 65 and 66 to eject the finished closure.

[0042] As shown in Fig. 11, a preformed end panel member 78 is loaded on core 67 which, in the first stage of the molding procedure is in registration with cavity 62. Upper and lower mold components 61 and 64 are then brought into contact with each other as shown in Fig. 12 and gasket forming melt is supplied to the outer inner periphery of the end panel member 78. After completion of the gasket forming step, the mold is then opened and lower mold member 64 then moved along the base member 68 so that the core 67 with the partially formed closure is in appropriate registration with the second cavity 63. As shown in Fig. 13, the mold is then closed and the suitable skirt forming melt is injected into the skirt defining mold cavity formed by the mold components and the end panel and gasket from the first stage of the molding sequence.

[0043] Upon completion of the formation of the skirt in surrounding and capturing relation to the end panel, the mold is then opened and knockout piston or cylinder 71 together with telescoping cylinders 76 and 77 operated to effect separation of mold member 65 and 66 for ejection of the finished closure 10 as shown in Fig. 14.

[0044] The foregoing description is set forth for illustrative purposes and merely represents one procedure by which closures of the present invention may be manufactured. Variations from this procedure will be readily apparent. For example, while the end panel member 78 when loaded on core 67 as shown in Fig. 11 can be fully shaped in accordance with its final configuration, it is also possible to effect further shaping thereof in the first stage of the molding procedure. Additionally, while the procedure as described shows the initial formation of the gasket and subsequent formation of the skirt, alternate configurations of the skirt and gasket may more suitably be manufactured by initial formation of the plastic skirt followed by panel insertion and then formation of the gasket. In some instances, formation of only the plastic skirt via molding may be utilized followed by subsequent insertion of a preformed gasket into the thus formed end panel and skirt. Correspondingly, if desired, the gasket



can be molded in a first station, followed by insertion of the end panel member into the thus molded gasket in a second station, and then molding of the skirt around the gasket and end panel member in a third station.

[0045] Referring now to Figs. 15-17, an alternate embodiment of the present invention is shown in the form of a lug type closure cap generally designated by the reference numeral 81 which is in overlying relation to a container 82 having an open mouth 83 defined by an end face 84 and neck portion 86. In this embodiment, neck portion 86 is provided with sequentially arranged partial threads 87 which are intended for cooperative mating engagement with plurality of lug projections 95 on the closure 81. A retaining bead 88 is provided for cooperative intersection with a tamper band.

[0046] Closure cap 81 includes a metal end panel having a central portion 90 adapted to overlie the mouth 83 of container 82. As shown, central portion 90 of the end panel includes a generally centrally located upwardly projecting button 91 which extends sequentially radially outwardly into a flat 91a, a gasket-receiving channel 99, and a generally cylindrical sidewall portion 92 that terminates in an inwardly curled end portion 93 which is encapsulated within a molded plastic skirt 94 having a plurality of integrally formed lugs 95 that cooperate with the threads 87. A drop down tamper indicating band 96 is integrally formed with and connected to the skirt 93 by means of a plurality of fractureable bridges 97. As shown, tamper indicating band includes an inwardly projecting flange sized and spaced to engage with retainer bead 88 of container 82 during closure removal to facilitate detachment of the band 96 from the body of the skirt. As best shown in Fig. 17, a gasket 98 is provided in the channel 99 located on the interior of the outer periphery of closure cap 81 and provides both a side and top seal with the outer surface of neck portion 83 as well as with the end face 84 thereof. Gasket 96 can be formed of any suitable elastomeric material which effects the desired sealing relationship with the upper portion of the cylindrical neck surface 86 and the end face 84 thereof. Suitable gasket materials include the aforementioned thermoplastic elastomers which desirably can be molded during the formation of the cap or conventional gasket materials such as, for example, plastics which are deposited into the channel 94.

[0047] Referring to Figs. 18-20, a PT closure cap 101 is depicted in overlying relationship to a container 102 having a neck portion 103 and a plurality of multiple lead helical threads 104 circumferentially disposed around the outer portion of the neck in overlying relation to a retainer bead 105. Container neck 103 terminates in an end surface 106 which, together with the neck portion defines an open mouth 107.

[0048] Referring to Fig. 20, it will be noted that the closure cap 101 includes a generally cup-shaped shell 108 having a central portion 109 adapted to overlie the mouth 107 of container 102. The central portion 109 of shell 108 extends downwardly into a cylindrical sidewall

portion 110 terminating in an outwardly turned end portion 111 which, in accordance with an important aspect of the present invention is encapsulated within the molded skirt 112. Interiorly of the sidewall portion 110 is a molded gasket 110a which forms a side seal with the container neck portion 103. A plurality of preformed threads 113 are provided on the interior cylindrical surface of skirt 112 for cooperative engagement with the threads 104 in the container neck. Again, as previously noted, a tamper indicating band 114 integrally formed with and connected with the skirt 112 by a plurality of bridges 115 is provided. The tamper indicating band includes an axially upwardly and radially inward end portion 116 adapted to engage retainer bead 105 during removable for facilitating the rupturing of the fractureable bridges and detachment of the band 114 from the main body of the skirt.

[0049] Figs. 21-23 illustrates a further embodiment of a PT closure 121 embodying the present invention. As best shown in Figs. 21 and 23, closure cap 121 is depicted in overlying relation to a container similar in construction to that previously described in connection with Fig. 18.

[0050] Closure cap 121 includes a disk shaped end panel 123 which extends radially outwardly as is captured by a skirt 124 and a gasket 125. The outer peripheral cut edge 123a of end panel 123 is encapsulated between the inner surface 126 of a radially inwardly extending flange 127 on the skirt 124 and the upper surface 128 of the gasket 125.

[0051] As shown, the gasket 125 includes an integral radially extending upper portion which terminates at a location on the inner surface of panel 123 which is radially outward of the inner periphery of the end face 106 so as to minimize migration of contaminants through the gasket into the interior of the container 102. As will be appreciated gasket 125, while providing sealing with the outer portion of the edge surface 106 is primarily of a side seal type with the interior surface 129 of such gasket being in direct sealing engagement with the upper outer cylindrical surface of neck 103.

[0052] If desired, the outer surface 131 of skirt 124 can be provided with a plurality of outer circumferentially disposed axially extending ribs 132 for facilitating grasping and removal of the closure cap. Correspondingly, the inner cylindrical surface of skirt sidewall 131 includes a plurality of internal threads 130 formed during the molding thereof which are adapted to matingly engaged with threads 104 on the outer surface of the neck.

[0053] Figs. 24-26 illustrate still yet a further embodiment of PT closure cap embodying the present invention which is generally designated by the reference numeral 135. As best shown in Fig. 26, closure cap 135 includes an end panel member 136 formed of metal having a central panel portion 137 that overlies the mouth of a container 107. End panel member 136 is provided with a button 138 which extends radially outwardly into an upwardly extending flange 139 and from said flange

into an annular rim 140 which, in turn, extends into an arcuate rim 141 that terminates in an axially downwardly extending end face 142 that is encapsulated entirely within a gasket 143 which, preferably, is formed by molding. As shown, the closure cap 135 includes a skirt 144 formed by molding the same in surrounding relationship to both the end panel member 136 and gasket 143. Skirt 144 includes an upper radially inwardly extending flange 145 which extends into a cylindrical sidewall 146 having an outer surface on which a plurality of circumferentially disposed axial ribs 147 are provided. The inner surface of the skirt sidewall 146 is provided with a plurality of preformed threads 148 which are adapted to be slidably received over the threads 104 on the container neck to facilitate press-on or non-rotary application of the closure cap to the container. If desired, the lowermost end portion of the skirt 144 can be provided with an integrally formed tamper indicating band 149 which is connected thereto by means of a plurality of frangible bridges 150 which can be formed by molding or slitting.

[0054] Referring now to Figs. 27-29, an alternate embodiment of the present invention is shown in the form of a press-on, pry off closure cap generally depicted by the reference numeral 151 which is in overlying relation to a container 152 having an open mouth 153 defined by an end face 154 and a neck portion 155. As shown, a circumferential, radially outwardly extending bead 156 is provided for cooperative interaction with a radially inwardly extending bead 157 in the closure cap 151 so as to effect securement of the closure cap 151 to the container neck 155. If desired, a retainer bead 158 can be provided on the container neck portion 156 for interaction in a known manner with a tamper indicating band (not shown).

[0055] Closure cap 151 includes a metal end panel 159 having a central portion 160 which is adapted to overlie the mouth 153 of container 152. As shown, central portion 160 of the end panel includes a generally centrally located upwardly extending button 161 which extends sequentially radially outwardly into an annular flat 162, an upwardly and radially outwardly extending flange 163, an annular rim 164, an arcuate and downwardly extending section 165 and an axially downwardly extending cut edge 166. As shown, the arcuate section 165 and cut edge 166 are encapsulated between the outer periphery 167 of a gasket 168 and the upper inner periphery 169 of the skirt 170 of closure cap 151.

[0056] In this illustrated embodiment, the upper end of skirt 170 terminates in a radially extending partial flange 171 which overlies only the outermost portion of annular rim 164 and the arcuate section 165 of metal end panel 159. If desired, however, upper flange 171 of skirt 170 can be sized to extend over a substantial portion of annular rim 164 in a fashion similar to that shown in the previously described embodiments.

[0057] Gasket 168 can be formed of any suitable elastomeric material which effects the desired sealing relationship with the upper portion of the neck surface 155

and end face 154. Suitable gasket materials include the aforementioned thermoplastic elastomers which desirably can be molded during the formation of the cap or conventional gasket materials such as, for example, plastisols

[0058] The present invention has been described in the context of a number of embodiments. It will be apparent to those skilled in this art, however, that modifications and variations therefrom can be made.

## Claims

1. A composite closure (10,81,101,121,135,151), said closure comprising: a metal end panel member (12,136,159) having a central portion (16,90,109,123,137,160) sized and positioned to overlie a mouth of a container (38,82,102,152) to which said closure is applied, said container mouth being defined by a generally cylindrical neck portion (41,86,103,155), said end panel member (12,136,159) having an upper surface and a lower surface and extending into a free edge (28,93,111,142,166) at a peripheral portion thereof, said peripheral portion including an inner surface and an outer surface adjacent to said free edge (28,93,111,142,166), a generally cylindrical plastic skirt (11,94,112,124,144,170) surrounding at least said peripheral portion of said outer surface of said end panel with at least a part of said central portion (16,90,109,123,137,160) being free of plastic, a gasket (14,98,110a,125,143,168) being within the closure (10,81,101,121,135,151) engageable with said neck portion (41,86,103,155) of said container to provide a seal therewith,

characterized in that the generally cylindrical plastic skirt (11,94,112,124,144,170) or the gasket (14,98,110a,125,143,168) is molded in surrounding and capturing relation to at least said peripheral portion whereby the outer surface of said peripheral portion is entirely covered by contact with said plastic skirt (12,94,112,144) or gasket (14,98,110a,125,143,168) and the inner surface of said peripheral portion is entirely covered by contact with one of said gasket (14) and said skirt (11,94,112,124,144), and in that said free edge (28,93,111,142,166) of the metal end panel (12,136) is entirely covered by said gasket (14,98,110a,125,143,168) and/or said plastic skirt (11,94,112,124,144,170).

2. A closure (10,151) according to claim 1 wherein said free edge (28,123a,166) of said end panel member is entirely covered by contact with said skirt (11,124,170) and gasket (14,125,168).

3. A closure (101) according to claim 1 wherein said free edge (93,111) of said end panel member is en-



- lirely covered by contact with said skirt (95,112).
4. A closure (135) according to claim 1 wherein said free edge (142) of said end panel member is entirely covered by contact with said gasket (143). 5
  5. A closure according to claim 1 wherein said gasket is molded to at least one of said end panel member and said skirt. 10
  6. A closure according to claim 1 wherein said gasket is molded to said end panel. 15
  7. A composite closure (10,121,135) adapted for press-on application to and rotational removable from a container (102), said closure comprising: a metal end panel member (12,123,136) having a generally circular central portion (16,123,137) sized and positioned to overlie a mouth of a container (38,102) to which said closure is applied, said container mouth defined by a generally cylindrical neck portion (41,103) which includes at least one external thread (32a,104), said end panel member having an upper surface and a lower surface and extending into a free edge (28,123a,142) at a peripheral portion thereof, said peripheral portion including an inner surface and an outer surface adjacent to said free edge; a generally cylindrical flexible skirt (11,124,144) composed of a flexible thermoplastic resin, said skirt being molded in surrounding and capturing relation to the end panel member and surrounding at least said peripheral portion of said outer surface of said end panel, said skirt (11,124,144) including at least one preformed internal thread (32,130,148) positioned and sized for mating engagement with said at least one external thread of said container neck, said skirt and preformed internal thread having respective internal diameters which enable the press-on application of said closure (10,121,135) to a container (38,104) but which require rotational movement for removal of said closure from said container, said plastic skirt (11,124,144) further including an upper annular flange (29,128,145) which extends inwardly of and over an outer periphery of the central portion of said end panel member with at least a radial innermost portion of an outer surface of the central portion of said end panel member being exposed; said gasket (14,125,143) molded to at least one of said end panel member and said skirt and being engageable within said closure with said neck portion of said container to provide a seal therewith; and, a cylindrical tamper band (13,149) extending downwardly from a lower portion of said skirt (11), said tamper band (13,149) being integrally formed with said skirt (11,124,144) and including an upper portion (44) joined to said skirt by a plurality of circumferentially disposed fracturable bridges (36,150) and a lower portion (47) which extends radially inwardly and axially upwardly for engagement with a retainer bead (49) on said container (102); 20 25 30 35 40 45 50 55
  8. A closure according to claim 7 wherein the free edge (28,123a) of said end panel member (12,123) is entirely covered by contact with said molded skirt (11,124) and said molded gasket (14,125).
  9. A closure according to claim 7 wherein said free edge of said end panel member is entirely covered by contact with said molded skirt.
  10. A closure according to claim 7 wherein said free edge (123a) of said end panel member is entirely covered by contact with said molded gasket (143).
  11. A closure according to claim 7 wherein said gasket (14,125,143) is molded to both of said end panel (12,123,126) and said skirt (11,124,144).
  12. A closure according to claim 7 wherein said gasket (14,125,143) is molded to said end panel member (12,124,144).
  13. A method of manufacturing a composite closure (10) having a preformed metal end panel (78) which includes an exposed central portion (16) captured in a circumferential skirt (11) formed by molding the same in surrounding and capturing relation to said end panel (78), said method comprising: providing a mold having first and second mold members (61,64) moveable with respect to each other into a mold open position and a mold closed position, placing a preformed metal end panel (78) in or on said first mold member (61), said preformed metal end panel (78) having a free edge (28) peripherally located with respect to a central portion (16) thereof, closing said mold to provide a melt-receiving chamber having a configuration which surrounds said end panel (78), said melt-receiving chamber terminating at a location which precludes the flow of melt onto said central portion (16) of said end panel (78), characterized by injecting a thermoplastic material into said melt-receiving chamber, the thermoplastic material flowing around the free edge (28) of the end panel (78) to entirely cover the free edge and forming a plastic skirt (11), which, upon cooling, surrounds and captures said end panel

(78) and leaves said central portion (16) of said end panel (78) exposed.

14. A method according to claim 13 wherein said end panel (78), prior to the injection molding of said skirt (11), includes a gasket (14).

15. A method according to claim 13 wherein said gasket (14) is formed by molding the same to said end panel (78).

16. A method of manufacturing a composite closure (10) having a preformed metal end panel (78), a generally cylindrical plastic skirt (11) in surrounding relation to said end panel (78) and a gasket (14) located within said closure (10), said gasket (14) being engageable with a neck finish of a container (38) to provide a seal therewith, said method comprising: positioning a preformed metal end panel (78) having a generally circular central portion (16) and a free edge (28) peripherally located with respect to said central portion (16) on a mold core (67), said core (67) being movable into a first mold cavity (62) to provide a first melt-receiving chamber having a configuration in conformance with a desired gasket shape, injecting a gasket-forming melt into said first melt-receiving chamber to form a gasket (14) on a first side of said preformed end panel (78), withdrawing said core (67) from said first mold cavity (62) and positioning said core with said end panel (78) and gasket (14) in registration with a second mold cavity (63), inserting said core (67) and preformed end panel (78) with the gasket (14) thereon into said second mold cavity (63) to define a second melt-receiving chamber having a configuration which surrounds said end panel (78), said second melt-receiving chamber terminating at a location which precludes the flow of melt onto the central portion (16) of a second side of said preformed end panel (78).

characterized by injecting a thermoplastic material into said second melt-receiving chamber, the thermoplastic material flowing around a free edge (28) of the end panel (78) to entirely cover the free edge (28) to form a plastic skirt (11) which, upon cooling, surrounds and captures said end panel (78) and leaves said central portion (16) of said end panel (78) exposed.

#### Patentansprüche

1. Verbundverschluss (10, 81, 101, 121, 135, 151), wobei der Verschluss umfasst: ein Metall-Endplattenelement (12, 136, 159), mit einem Mittelabschnitt (16, 90, 109, 123, 137, 160), der eine solche Größe und Anordnung hat, dass er über einer Öffnung eines Behälters (38, 82, 102, 152) liegt, auf

dem der Verschluss angebracht ist, wobei die Behälteröffnung durch einen allgemein zylindrischen Halsabschnitt (41, 86, 103, 155) definiert ist, wobei das Endplattenelement (12, 136, 159) eine Oberseite und eine Unterseite aufweist und sich an seinem Umfangsabschnitt zu einem freien Rand (28, 93, 111, 142, 166) erstreckt, wobei der Umfangsabschnitt angrenzend an den freien Rand (28, 93, 111, 142, 166) eine Innenfläche und eine Außenfläche umfasst, wobei eine allgemein zylindrische Kunststoffeinfassung (11, 94, 112, 124, 144, 170) zumindest den Umfangsabschnitt der Außenfläche der Endplatte umgibt, wobei zumindest ein Teil des Mittelabschnitts (16, 90, 109, 123, 137, 160) frei von Kunststoff ist, wobei sich innerhalb des Verschlusses (10, 81, 101, 121, 135, 151) eine Dichtung (14, 98, 110a, 125, 143, 168) befindet, die mit dem Halsabschnitt (41, 86, 103, 155) des Behälters in Eingriff gebracht werden kann, um einen Verschluss damit herzustellen,

dadurch gekennzeichnet, dass die allgemein zylindrische Kunststoffeinfassung (11, 94, 112, 124, 144, 170) oder die Dichtung (14, 98, 110a, 125, 143, 168) in umgebender und haltender Beziehung mit zumindest dem Umfangsabschnitt geformt ist, wodurch die Außenfläche des Umfangsabschnitts durch Kontakt mit der Kunststoffeinfassung (11, 94, 112, 144) oder Dichtung (14, 98, 110a, 125, 143, 168) vollständig bedeckt ist und die Innenfläche des Umfangsabschnitts durch Kontakt mit einem aus der Dichtung (14) und der Einfassung (11, 94, 112, 124, 144) vollständig bedeckt ist, und dadurch, dass der freie Rand (28, 93, 11, 142, 166) der Metall-Endplatte (12, 136) vollständig durch die Dichtung (14, 98, 110a, 125, 143, 168) und/oder die Kunststoffeinfassung (11, 94, 112, 124, 144, 170) bedeckt ist.

2. Verschluss (10, 151) nach Anspruch 1, worin der freie Rand (28, 123a, 166) des Endplattenelements durch Kontakt mit der Einfassung (11, 124, 170) und Dichtung (14, 125, 168) vollständig bedeckt ist.

3. Verschluss (101) nach Anspruch 1, worin der freie Rand (93, 111) des Endplattenelements durch Kontakt mit der Einfassung (95, 112) vollständig bedeckt ist.

4. Verschluss (135) nach Anspruch 1, worin der freie Rand (142) des Endplattenelements durch Kontakt mit der Dichtung (143) vollständig bedeckt ist.

5. Verschluss nach Anspruch 1, worin die Dichtung an zumindest eines aus dem Endplattenelement und der Einfassung angeformt ist.

6. Verschluss nach Anspruch 1, worin die Dichtung an die Endplatte angeformt ist.

7. Verbundverschluss (10, 121, 135), der zum Aufpressen auf einen Behälter (102) ausgebildet und von diesem durch Drehen abgenommen werden kann, wobei der Verschluss umfasst: ein Metall-Endplattenelement (12, 123, 136) mit einem allgemein kreisförmigen Mittelabschnitt (16, 123, 137), der eine solche Größe und Positionierung aufweist, dass er über einer Öffnung eines Behälters (38, 102) liegt, auf dem der Verschluss angebracht ist, wobei die Behälteröffnung durch einen allgemein zylindrischen Halsabschnitt (41, 103) definiert ist, der zumindest ein Außengewinde (32a, 104) umfasst, wobei das Endplattenelement eine Oberseite und eine Unterseite aufweist und sich an seinem Umfangsabschnitt zu einem freien Rand (28, 123a, 142) erstreckt, wobei der Umfangsabschnitt angrenzend an den freien Rand eine Innenfläche und eine Außenfläche umfasst; eine allgemein zylindrische flexible Einfassung (11, 124, 144) die aus einem flexiblen thermoplastischen Harz besteht, wobei die Einfassung so geformt ist, dass sie sich in umgebender und einschließender Beziehung mit dem Endplattenelement befindet und zumindest den Umfangsabschnitt der Außenseite der Endplatte umgibt, wobei die Einfassung (11, 124, 144) zumindest ein vorgeformtes Innengewinde (32, 130, 148) umfasst, dass so angeordnet und dimensioniert ist, dass es sich in Passungeingriff mit dem zumindest einen Außengewinde des Behälterhalses befindet, wobei die Einfassung und das vorgeformte Innengewinde jeweilige Innendurchmesser aufweisen, die das Aufpressen des Verschlusses (10, 121, 135) auf einen Behälter (38, 104) zulassen, aber zum Abnehmen des Verschlusses vom Behälter Drehbewegung erfordern, wobei die Kunststoffeinfassung (11, 124, 144) weiters einen oberen ringförmigen Flansch (29, 128, 145) umfasst, der sich innerhalb des Mittelabschnitts des Endplattenelements und über dessen Außenumfang erstreckt, wobei zumindest ein radial innerster Abschnitt der Außenseite des Mittelabschnitts des Endplattenelements freiliegt; wobei die Dichtung (14, 125, 143) an zumindest eines aus dem Endplattenelement und der Einfassung angeformt ist und innerhalb des Verschlusses mit dem Halsabschnitt des Behälters in Eingriff gebracht werden kann, um damit dichtend zu schließen; sowie einen zylindrischen manipulationsanzeigenden Ring (13, 149), der sich von einem unteren Abschnitt der Einfassung (11) nach unten erstreckt, wobei der manipulationsanzeigende Ring (13, 149) mit der Einfassung (11, 124, 144) einstückig ausgebildet ist und einen oberen Abschnitt (44), der durch eine Vielzahl von den Umfang entlang angeordneten durchtrennbaren Brücken (36, 150) mit der Einfassung verbunden ist, sowie einen unteren Abschnitt (47) umfasst, der sich radial nach innen und axial nach oben erstreckt, so dass er sich mit einem Rückhaltewulst (49) am Behälter (102) in Eingriff befindet; **dadurch gekennzeichnet, dass die Außenseite des Umfangsabschnitts durch Formungskontakt vollständig mit der Kunststoffeinfassung (11) oder der Dichtung (125, 143) bedeckt ist und die Innenseite des Umfangsabschnitts durch Kontakt vollständig mit der Dichtung (14, 125, 143) bedeckt ist, und dass der freie Rand (28, 123a, 142) der Metall-Endplatte (12, 123, 126) vollständig mit der Dichtung (14, 125, 143) und/oder der Kunststoffeinfassung (11, 124, 144) bedeckt ist.**
8. Verschluss nach Anspruch 7, worin der freie Rand (28, 123a) des Endplattenelements (12, 123) durch Kontakt vollständig mit der geformten Einfassung (11, 124) und der geformten Dichtung (14, 125) bedeckt ist.
9. Verschluss nach Anspruch 7, worin der freie Rand des Endplattenelements durch Kontakt vollständig mit der geformten Einfassung bedeckt ist.
10. Verschluss nach Anspruch 7, worin der freie Rand (123a) des Endplattenelements durch Kontakt vollständig mit der geformten Dichtung (143) bedeckt ist.
11. Verschluss nach Anspruch 7, worin die Dichtung (14, 125, 143) sowohl an die Endplatte (12, 123, 126) als auch die Einfassung (11, 124, 144) angeformt ist.
12. Verschluss nach Anspruch 7, worin die Dichtung (14, 125, 143) an das Endplattenelement (12, 124, 144) angeformt ist.
13. Verfahren zur Herstellung eines Verbundverschlusses (10) mit einer vorgeformten Metallendplatte (78), die einen freiliegenden Mittelabschnitt (16) umfasst, der in einer Umfangseinfassung (11) festgehalten wird, die durch Formen derselben in umgebender und einschließender Beziehung mit der Endplatte (78) gebildet ist, wobei das Verfahren umfasst: das Bereitstellen einer Form mit einem ersten und einem zweiten Formelement (61, 64), die in Bezug auf einander in eine offene Formposition und eine geschlossene Formposition bewegt werden können, das Anordnen einer vorgeformten Metallendplatte (78) im oder auf dem ersten Formelement (61), wobei die vorgeformte Metallendplatte (78) einen freien Rand (28) aufweist, der in Bezug auf ihren Mittelabschnitt (16) am Umfang angeordnet ist, das Schließen der Form, um eine Schmelze-Aufnahmekammer bereitzustellen, die eine Konfiguration aufweist, die die Endplatte (78) umgibt, wobei die Schmelze-Aufnahmekammer an einer solchen Position endet, dass das Fließen von Schmelze auf den Mittelabschnitt (16) der Endplatte

le (78) verhindert wird, **gekennzeichnet durch** das Einspritzen eines thermoplastischen Materials in die Schmelze-Aufnahmekammer, wobei das thermoplastische Material um den freien Rand (28) der Endplatte (78) fließt, so dass der freie Rand vollständig bedeckt wird und eine Kunststoffeinfassung (11) gebildet wird, die nach dem Abkühlen die Endplatte (78) umgibt und umschließt und den Mittelabschnitt (16) der Endplatte (78) frei lässt.

14. Verfahren nach Anspruch 13, worin die Endplatte (78) vor dem Spritzgießen der Einfassung (11) eine Dichtung (14) umfasst.

15. Verfahren nach Anspruch 13, worin die Dichtung (14) durch Anformen der derselben an die Endplatte (78) gebildet wird.

16. Verfahren zur Herstellung eines Verbundverschlusses (10) mit einer vorgeformten Metall-Endplatte (78), einer allgemein zylindrischen Kunststoffeinfassung (11) in umgebender Beziehung mit der Endplatte (78) und einer Dichtung (14), die innerhalb des Verschlusses (10) angeordnet ist, wobei die Dichtung (14) mit einem Halsabschluss eines Behälters (38) in Eingriff gebracht werden kann, um damit dicht zu schließen, wobei das Verfahren umfasst: das Anordnen einer vorgeformten Metall-Endplatte (78) mit einem allgemein kreisförmigen Mittelabschnitt (16) und einem freien Rand (28), der in Bezug auf den Mittelabschnitt (16) am Umfang angeordnet ist, auf einem Formkern (67), wobei der Kern (67) in einen ersten Formhohlraum (62) bewegt werden kann, um eine erste Schmelze-Aufnahmekammer bereitzustellen, die eine Konfiguration aufweist, die mit einer erwünschten Dichtungs-gestalt übereinstimmt, das Einspritzen einer die Dichtung bildenden Schmelze in die erste Schmelze-Aufnahmekammer, um auf einer ersten Seite der vorgeformten Endplatte eine Dichtung (14) zu bilden, das Herausziehen des Kerns (67) aus dem ersten Formhohlraum (62) und das Anordnen des Kerns auf solche Weise, dass die Endplatte (78) und die Dichtung (14) mit einem zweiten Formhohlraum (63) ausgerichtet sind, das Einsetzen des Kerns (67) und der vorgeformten Endplatte (78) mit der Dichtung (14) darauf in den zweiten Formhohlraum (63), um eine zweite Schmelze-Aufnahmekammer mit einer solchen Konfiguration zu definieren, dass sie die Endplatte (78) umgibt, wobei die zweite Schmelze-Aufnahmekammer an einer Position endet, durch die das Fließen von Schmelze auf den Mittelabschnitt (16) der zweiten Seite der vorgeformten Endplatte (78) verhindert wird, **gekennzeichnet durch** das Einspritzen eines thermoplastischen Materials in die zweite Schmelze-Aufnahmekammer, wobei das thermoplastische Material so um einen freien Rand (28) der Endplatte

(78) fließt, dass es den freien Rand (28) vollständig bedeckt, wodurch eine Kunststoffeinfassung (11) gebildet wird, die nach dem Abkühlen die Endplatte (78) umgibt und umschließt und den Mittelabschnitt (16) der Endplatte (78) frei lässt.

## Revendications

1. Une fermeture composite (10, 81, 101, 121, 135, 151), ladite fermeture comprenant : un élément métallique formant panneau d'extrémité (12, 136, 159) présentant une partie centrale (16, 90, 109, 123, 137, 160) dimensionnée et mise en place pour recouvrir l'embouche d'un récipient (38, 82, 102, 152) sur lequel est appliquée ladite fermeture, l'embouchure dudit récipient étant définie par une partie de col de forme générale cylindrique (41, 86, 103, 155), ledit élément formant panneau d'extrémité (12, 136, 159) présentant une surface supérieure et une surface inférieure et s'étendant en un bord libre (28, 93, 111, 142, 166) au niveau de sa partie périphérique, ladite partie périphérique comprenant une surface interne et une surface externe adjacente audit bord libre (28, 98, 111, 142, 166), une jupe en matière plastique de forme générale cylindrique (11, 94, 112, 124, 144, 170) entourant au moins ladite partie périphérique de ladite surface externe dudit panneau d'extrémité avec au moins une portion de ladite partie centrale (16, 90, 109, 123, 137, 160) qui est exempte de matière plastique, un joint (14, 98, 110a, 125, 143, 168) étant, à l'intérieur de la fermeture (10, 81, 101, 121, 135, 151), engagé avec ladite partie de col (41, 86, 103, 155) dudit récipient pour créer une étanchéité avec celui-ci, **caractérisé en ce que** la jupe en matière plastique de forme générale cylindrique (11, 94, 112, 124, 144, 170) ou le joint (14, 98, 110a, 125, 143, 168) est moulé en relation d'entourage et d'ancrage sur au moins ladite partie périphérique de sorte que la surface externe de ladite partie périphérique est entièrement couverte par contact avec ladite jupe de matière plastique (12, 94, 112, 144) ou ledit joint (14, 98, 110a, 125, 143, 168) et la surface interne de ladite partie périphérique est entièrement couverte par contact avec l'un parmi ledit joint (14) et ladite jupe (11, 94, 112, 124, 144), et **en ce que** ledit bord libre (28, 93, 111, 142, 166) du panneau métallique d'extrémité (12, 136) est entièrement couvert par ledit joint (14, 98, 110a, 125, 143, 168) et/ou ladite jupe en matière plastique (11, 94, 112, 124, 144, 170).
2. Une fermeture (10, 151) selon la revendication 1 dans laquelle ledit bord libre (28, 123a, 166) dudit élément formant panneau d'extrémité est entièrement couvert par contact avec ladite jupe (11, 124, 170) et ledit joint (14, 125, 168).

3. Une fermeture (101) selon la revendication 1 dans laquelle ledit bord libre (93, 111) dudit élément formant panneau d'extrémité est entièrement couvert par contact avec ladite jupe (95, 112).
4. Une fermeture (135) selon la revendication 1 dans laquelle ledit bord libre (142) dudit élément formant panneau d'extrémité est entièrement couvert par contact avec ledit joint (143).
5. Une fermeture selon la revendication 1 dans laquelle ledit joint est moulé sur au moins l'un parmi ledit élément formant panneau d'extrémité et ladite jupe.
6. Une fermeture selon la revendication 1 dans laquelle ledit joint est moulé sur ledit panneau d'extrémité.
7. Une fermeture composite (10, 121, 135) adaptée à être appliquée par pression sur un récipient (102) et être retirée de celui-ci par rotation, ladite fermeture comprenant : un élément métallique formant panneau d'extrémité (12, 123, 136) présentant une partie centrale de forme générale circulaire (16, 123, 137) dimensionnée et mise en place pour recouvrir l'embouchure d'un récipient (38, 102) sur lequel est appliquée ladite fermeture, l'embouchure dudit récipient étant définie par une partie de col de forme générale cylindrique (41, 103) qui comprend au moins un filet externe (32a, 104), ledit élément formant panneau d'extrémité présentant une surface supérieure et une surface inférieure et s'étendant en un bord libre (28, 123a, 142) au niveau de sa partie périphérique, ladite partie périphérique comprenant une surface interne et une surface externe adjacente audit bord libre ; une jupe souple de forme générale cylindrique (11, 124, 144) formée d'une résine thermoplastique souple, ladite jupe étant moulée dans une relation d'entourage et d'ancrage sur ledit élément formant panneau d'extrémité et entourant au moins ladite partie périphérique de ladite surface externe dudit panneau d'extrémité, ladite jupe (11, 124, 144) comprenant au moins un filet interne préformé (32, 130, 148) mis en place et dimensionné en vue d'un engagement conjugué avec ledit au moins un filet externe du col dudit récipient, ladite jupe et ledit filet externe préformé ayant des diamètres internes respectifs qui permettent l'application par pression de ladite fermeture (10, 121, 135) sur un récipient (38, 104) mais qui nécessitent un mouvement de rotation pour retirer ladite fermeture dudit récipient, ladite jupe en matière plastique (11, 124, 144) comprenant en outre une bride annulaire supérieure (29, 128, 145) qui s'étend vers l'intérieur et sur une périphérie externe de la partie centrale dudit élément formant panneau d'extrémité avec au moins une partie radiale la plus interne d'une surface externe de la partie centrale dudit élément formant panneau d'extré-

mité qui est mise à nue ; ledit joint (14, 125, 143) moulé sur au moins un parmi ledit élément formant panneau d'extrémité et ladite jupe et pouvant s'engager à l'intérieur de ladite fermeture avec ladite partie de col dudit récipient pour créer un joint avec lui ; et une bande cylindre de protection (13, 149) s'étendant vers le bas depuis une partie inférieure de ladite jupe (11), ladite bande de protection (13, 149) étant formée de manière intégrante avec ladite jupe (11, 124, 144) et comprenant une partie supérieure (44) réunie à ladite jupe par une pluralité de ponts fracturables disposés de manière circonférentielle (36, 150) et une partie inférieure (47) qui s'étend radialement vers l'intérieur et axialement vers le haut pour s'engager avec une moulure de retenue (49) prévue sur ledit récipient (102) ;

caractérisé en ce que la surface externe de ladite partie périphérique est entièrement couverte par contact moulé avec ladite jupe de matière plastique (11) ou le joint (125, 143) et la surface interne de ladite partie périphérique est entièrement couverte par contact avec ledit joint (14, 125, 143), et en ce que ledit bord libre (28, 123a, 142) du panneau métallique d'extrémité (12, 123, 126) est entièrement couvert par ledit joint (14, 125, 143) et/ou ladite jupe en matière plastique (11, 124, 144).

8. Une fermeture selon la revendication 7, dans laquelle le bord libre (28, 123a) dudit élément formant panneau d'extrémité (12, 123) est entièrement couvert par contact avec ladite jupe moulée (11, 124) et ledit joint moulé (14, 125).
9. Une fermeture selon la revendication 7 dans laquelle ledit bord libre dudit élément formant panneau d'extrémité est entièrement couvert par contact avec ladite jupe moulée.
10. Une fermeture selon la revendication 7 dans laquelle ledit bord libre (123a) dudit élément formant panneau d'extrémité est entièrement couvert par contact avec ledit joint moulé (143).
11. Une fermeture selon la revendication 7 dans laquelle ledit joint (14, 124, 143) est moulé à la fois sur ledit panneau d'extrémité (12, 123, 126) et sur ladite jupe (11, 124, 144).
12. Une fermeture selon la revendication 7 dans laquelle ledit joint (14, 125, 143) est moulé sur ledit élément formant panneau d'extrémité (12, 124, 144).
13. Un procédé de fabrication d'une fermeture composite (10) présentant un panneau métallique d'extrémité préformé (78) qui comprend une partie centrale mise à nue (16) ancrée dans une jupe circonférentielle (11) formée par moulage de celle-ci dans une relation d'entourage et d'ancrage par rapport

audit panneau d'extrémité (78), ledit procédé comprenant les étapes consistant à : créer un moule présentant de premier et second éléments de moulage (61, 64) mobiles l'un par rapport à l'autre dans une position ouverte du moule et une position fermée du moule, placer un panneau métallique d'extrémité préformé (78) dans ou sur ledit élément de moulage (61), ledit panneau métallique d'extrémité préformé (78) présentant un bord libre (28) situé de manière périphérique par rapport à sa partie centrale (16), fermer ledit moule pour créer une chambre de réception de produit fondu présentant une configuration qui entoure ledit panneau d'extrémité (78), ladite chambre de réception de produit fondu se terminant au niveau d'un emplacement qui empêche l'écoulement de produit fondu sur ladite partie centrale (16) dudit panneau d'extrémité (78),

caractérisé par le fait d'injecter une matière thermoplastique dans la chambre de réception de produit fondu, la matière thermoplastique s'écoulant autour du bord libre (28) du panneau d'extrémité (78) pour entièrement couvrir le bord libre et former une jupe de matière plastique (11) qui, lors du refroidissement, entoure et ancre ledit panneau d'extrémité (78) et laisse à nue ladite partie centrale (16) dudit panneau d'extrémité (78).

14. Un procédé selon la revendication (13) dans lequel ledit panneau d'extrémité (78), avant l'étape de moulage par injection de ladite jupe (11), comprend un joint (14).

15. Un procédé selon la revendication (13) dans lequel ledit joint (14) est constitué par moulage de celui-ci sur ladite panneau d'extrémité (78).

16. Un procédé de fabrication d'une fermeture composite (10) présentant un panneau métallique d'extrémité préformé (78), une jupe en matière plastique de forme générale cylindrique (11) dans une relation d'entourage par rapport audit panneau (78) et un joint (14) situé à l'intérieur de ladite fermeture (10), ledit joint (14) pouvant être engagé avec une finition de col d'un récipient (30) pour créer une étanchéité avec celui-ci, ledit procédé comprenant les étapes consistant à : mettre en place un panneau métallique d'extrémité préformé (78) présentant une partie centrale de forme générale circulaire (16) et un bord libre (28) situé de manière périphérique par rapport à ladite partie centrale (16) sur un noyau de moulage (67), ledit noyau (67) étant déplaçable dans une première cavité de moulage (62) pour créer une première chambre de réception de produit fondu présentant une configuration épousant une forme de joint désirée, injecter un produit fondu formant joint dans ladite première chambre de réception de produit fondu pour constituer un joint (14) sur un premier côté dudit panneau d'ex-

trémité préformé (78), retirer ledit noyau (67) de ladite première cavité de moulage (62) et mettre en place ledit noyau avec ledit panneau d'extrémité (78) et ledit joint (14) en concordance avec une seconde cavité de moulage (63), insérer ledit noyau (67) et ledit panneau d'extrémité (78) avec le joint (14) dessus dans ladite seconde cavité de moulage (63) pour définir une seconde chambre de réception de produit fondu présentant une configuration qui entoure ledit panneau d'extrémité (78), ladite seconde chambre de réception de produit fondu se terminant au niveau d'un emplacement qui empêche l'écoulement de produit fondu sur la partie centrale (16) d'un second côté dudit panneau d'extrémité préformé (78),

caractérisé par le fait d'injecter une matière thermoplastique dans ladite seconde chambre de réception de produit fondu, la matière thermoplastique s'écoulant autour d'un bord libre (28) du panneau d'extrémité (78) pour entièrement couvrir le bord libre (28) afin de constituer une jupe en matière plastique (11) qui, en refroidissant, entoure et ancre ledit panneau d'extrémité (78) et laisse à nue ladite partie centrale (16) dudit panneau d'extrémité (78).



FIG. 1

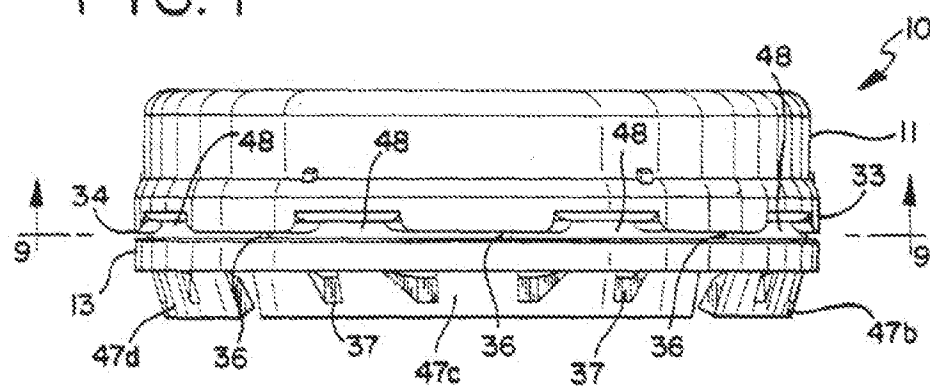


FIG. 2

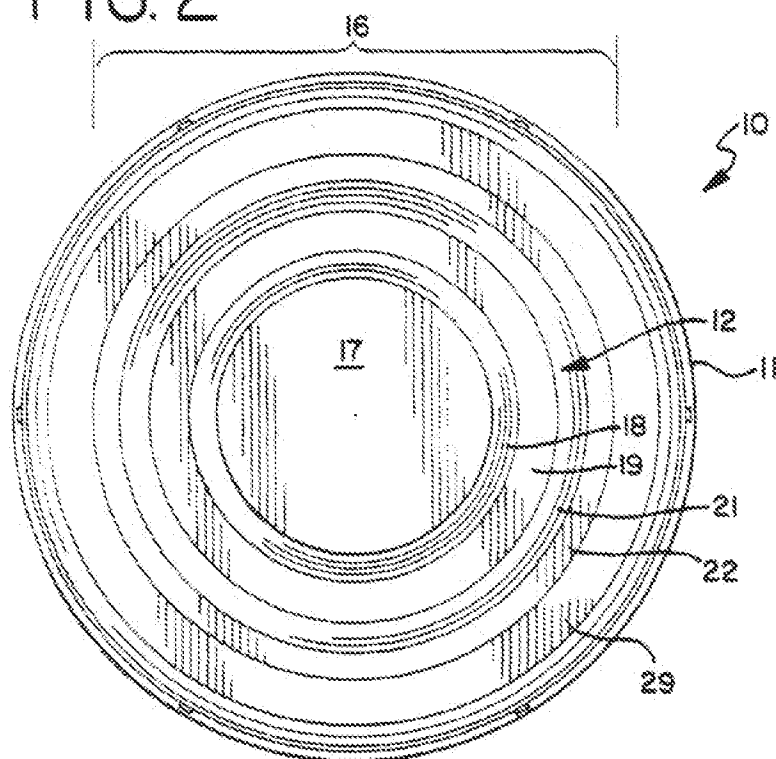
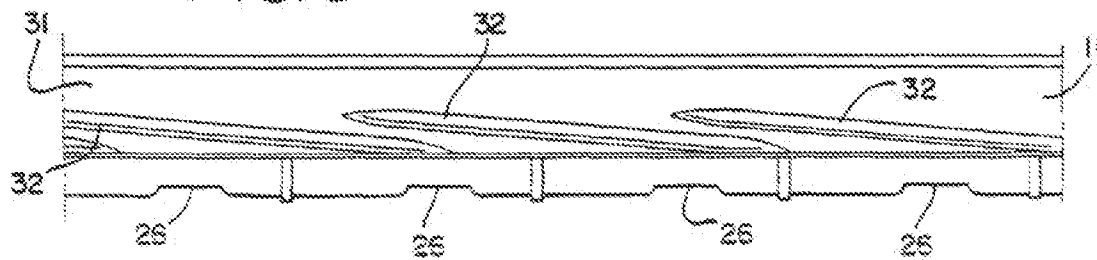


FIG. 3



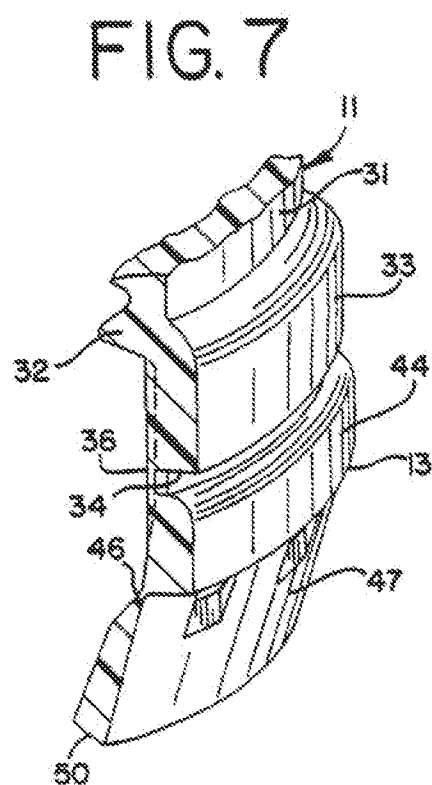
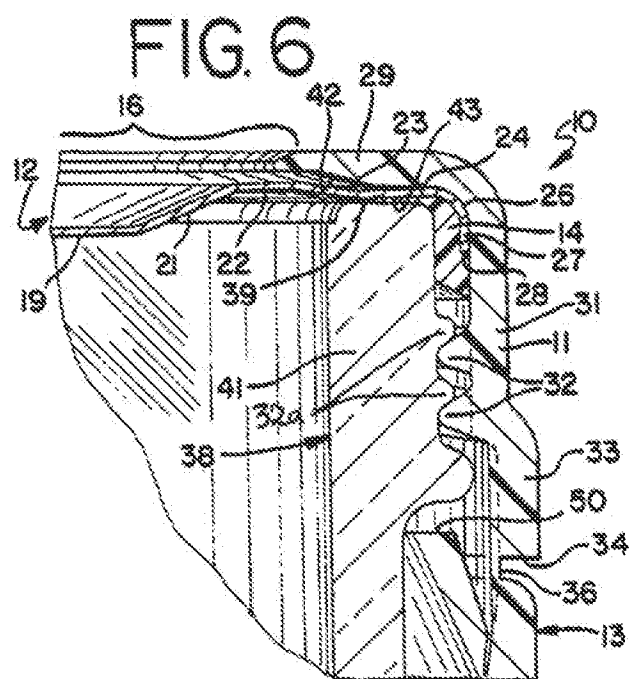
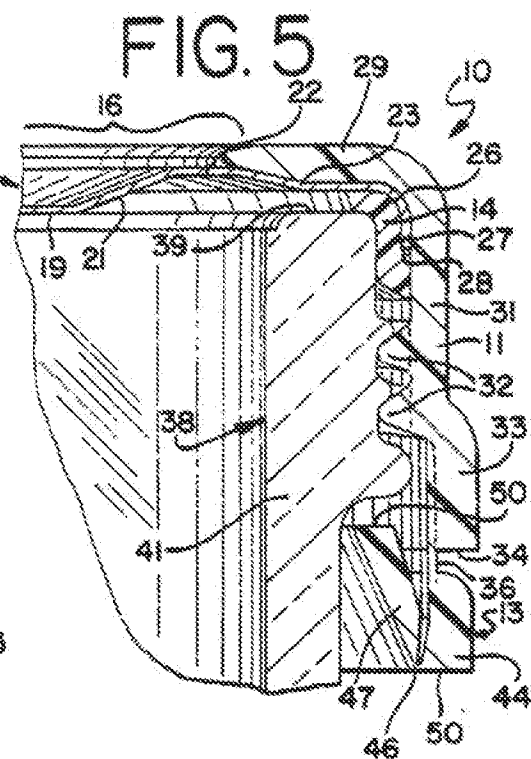
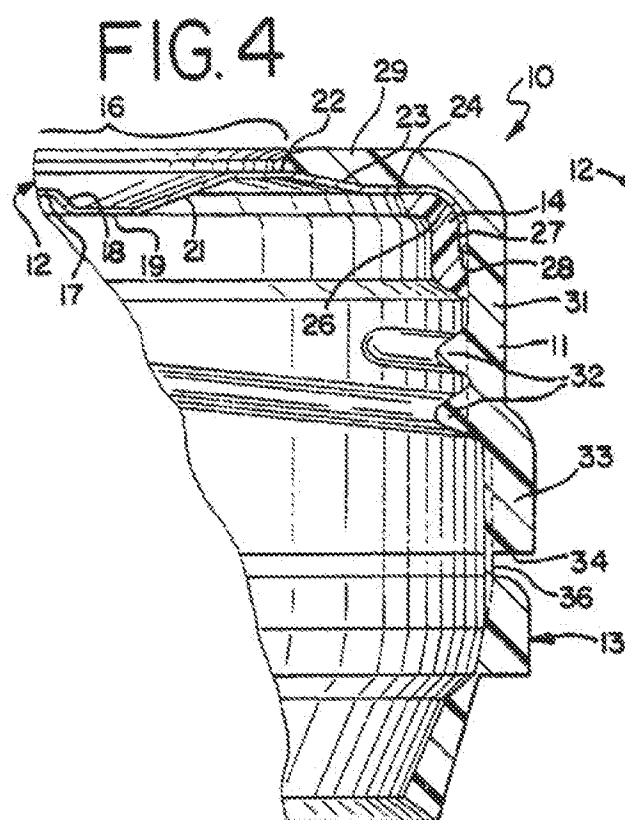


FIG. 8

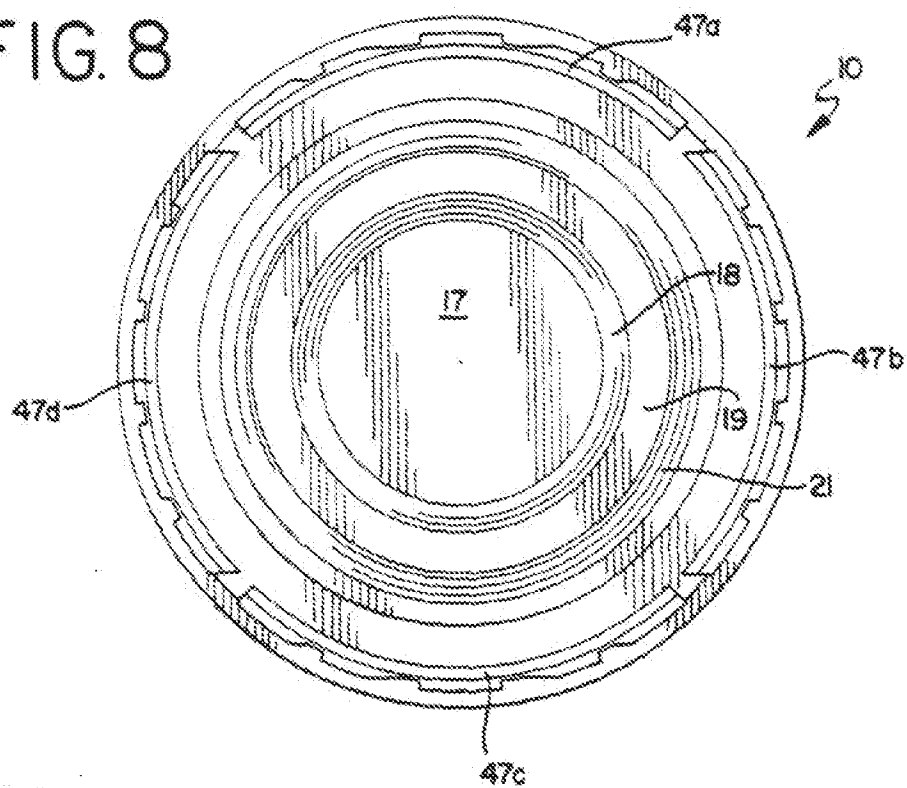


FIG. 9

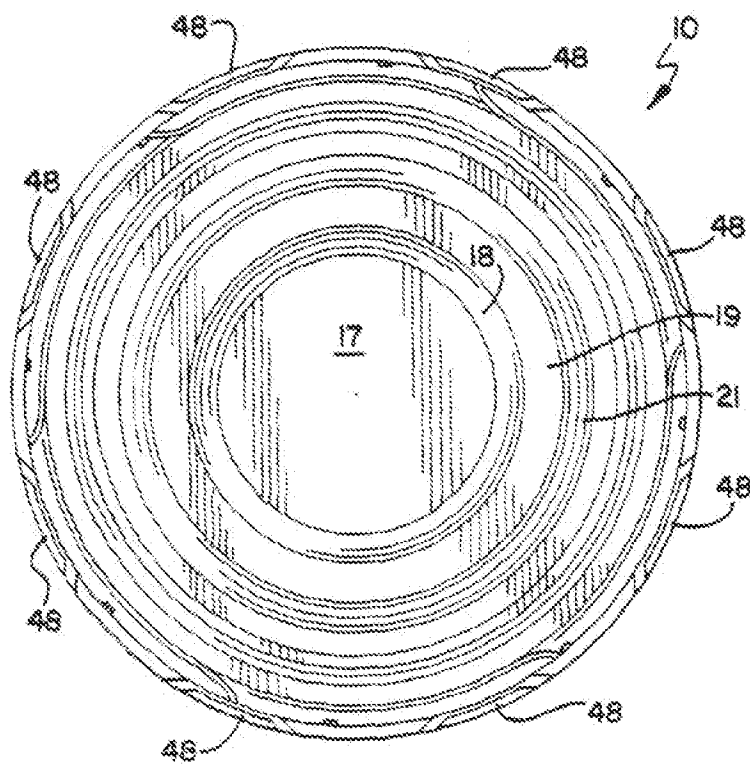


FIG. 10

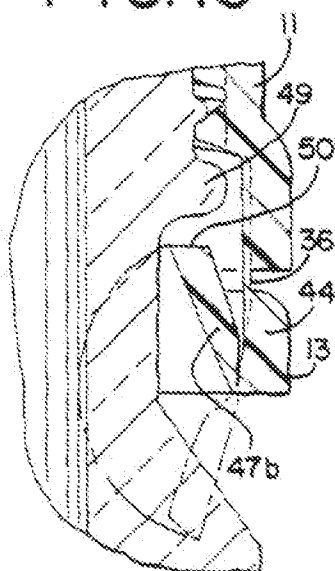


FIG. 11

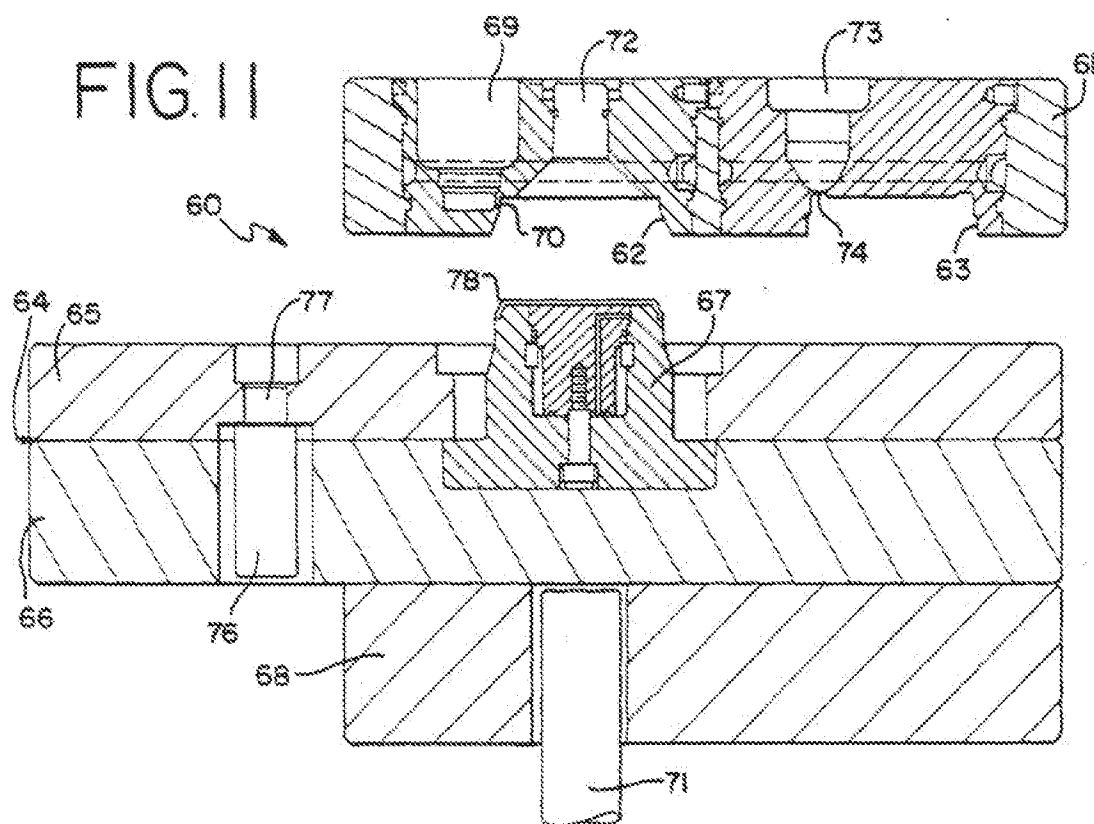


FIG. 12

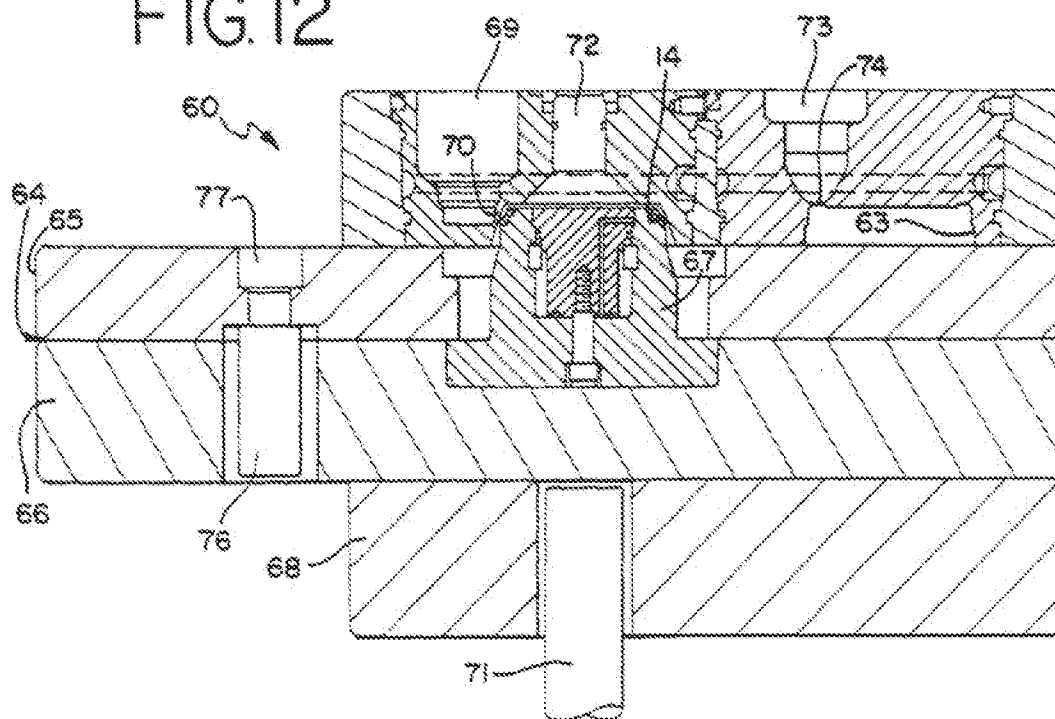


FIG. 13

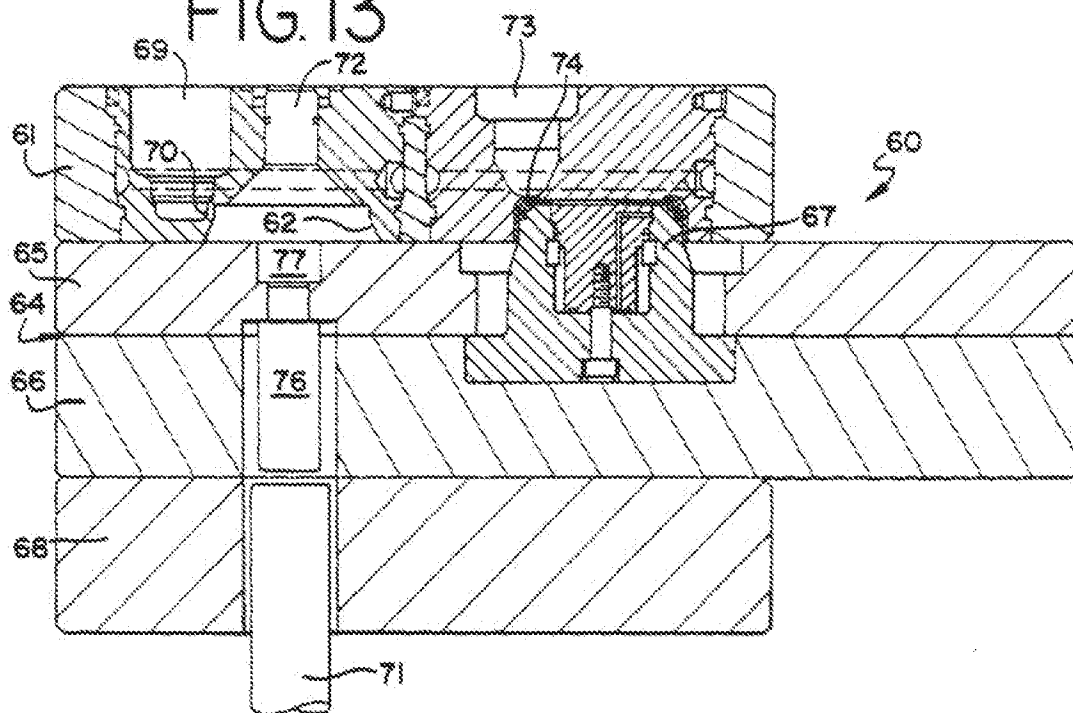


FIG. 14

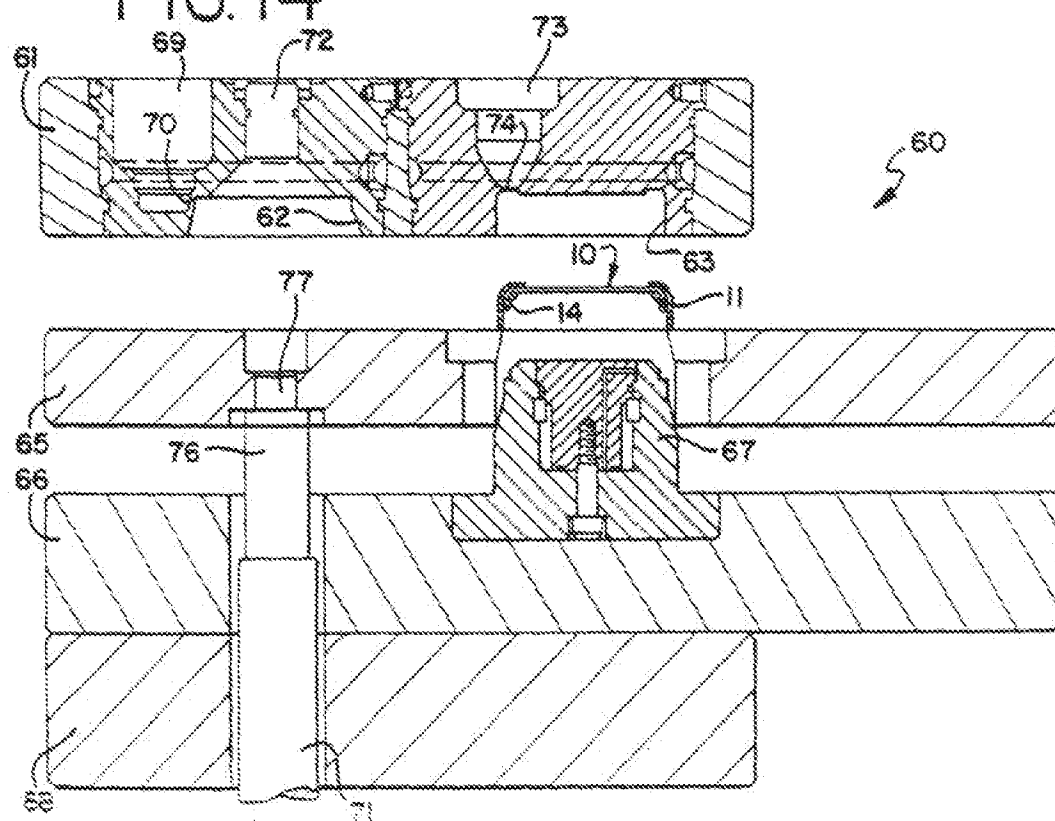


FIG. 15

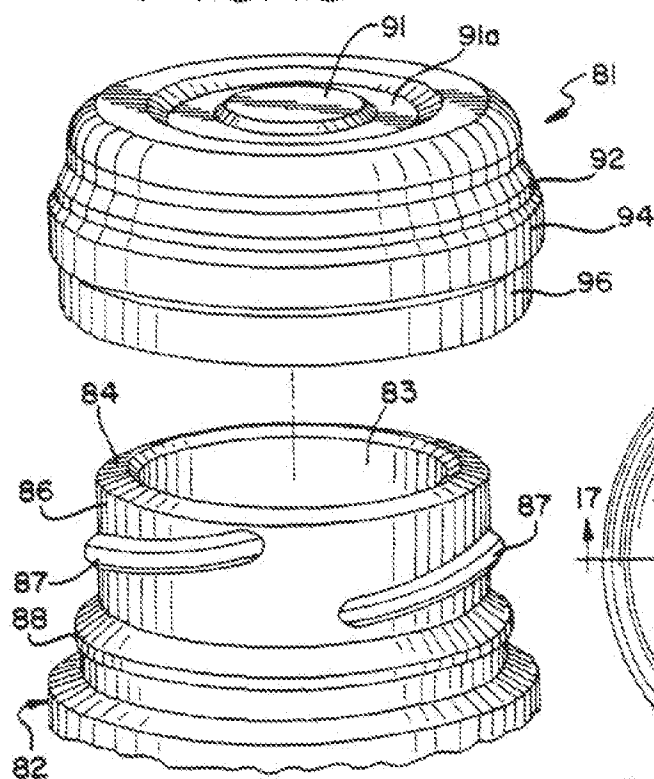


FIG. 16

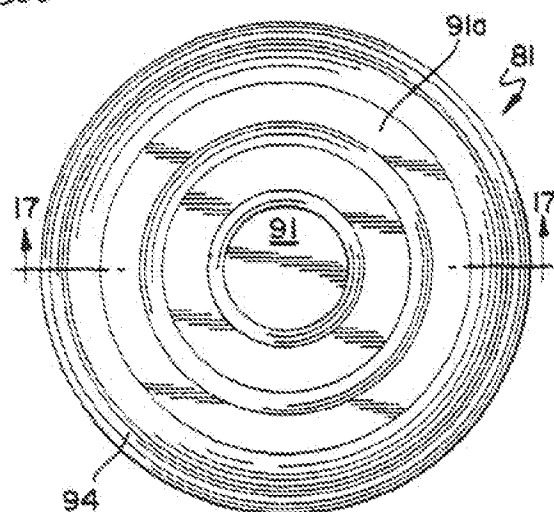


FIG. 17

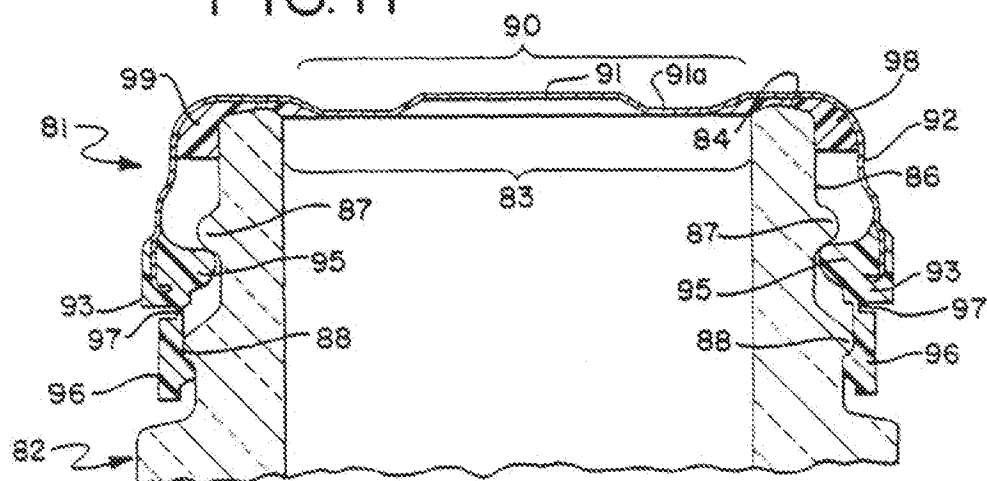




FIG. 18

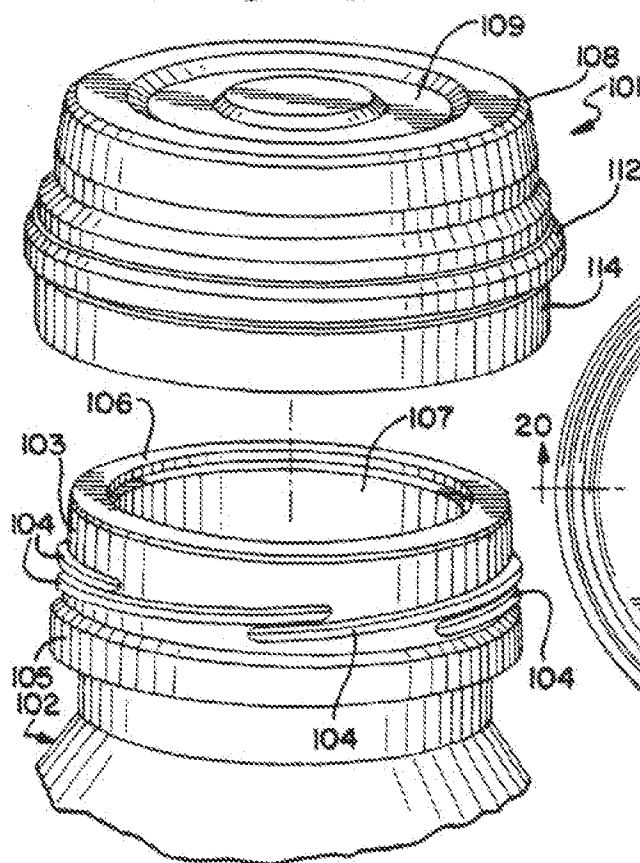


FIG. 19

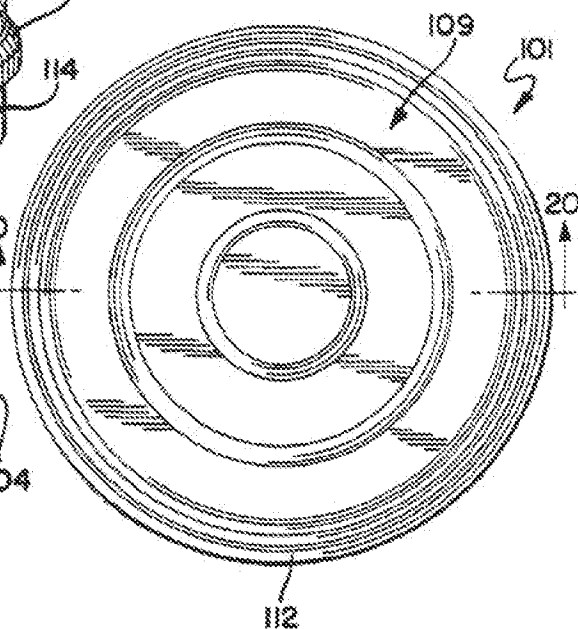


FIG. 20

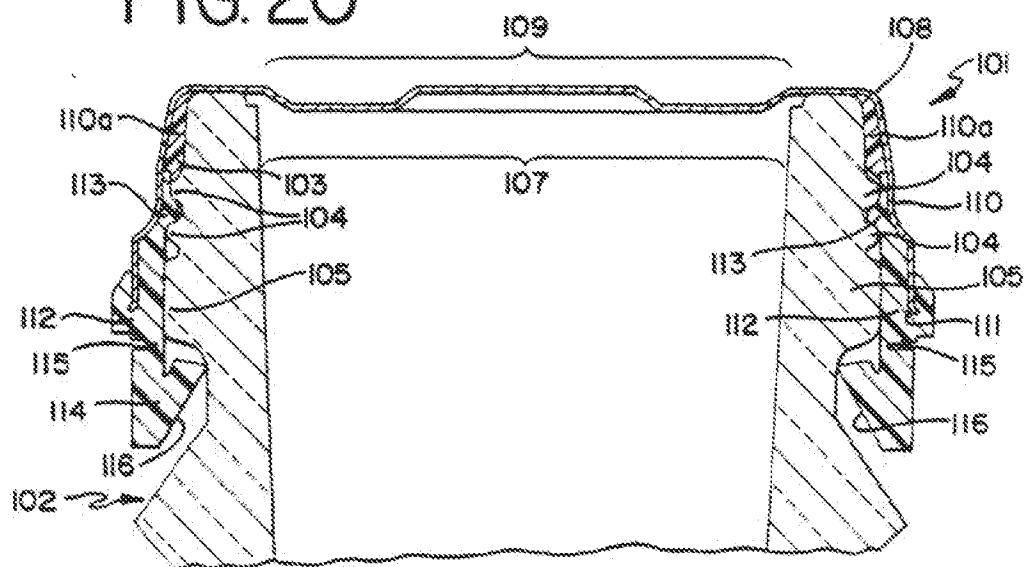


FIG. 21

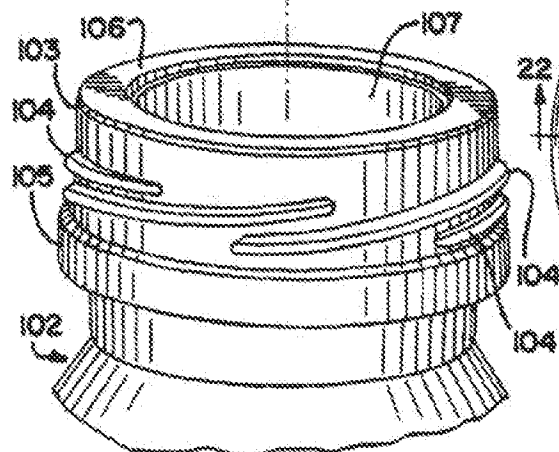
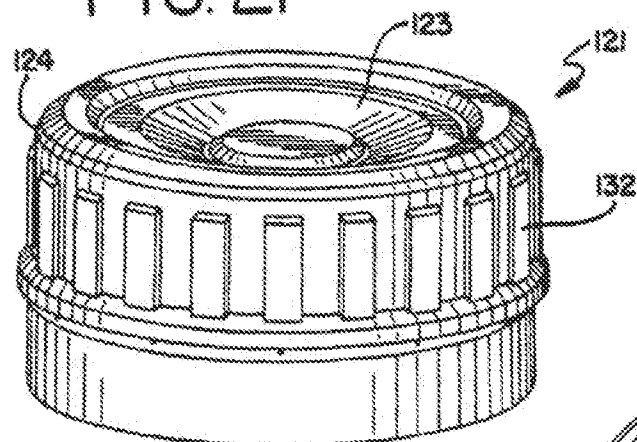


FIG. 22

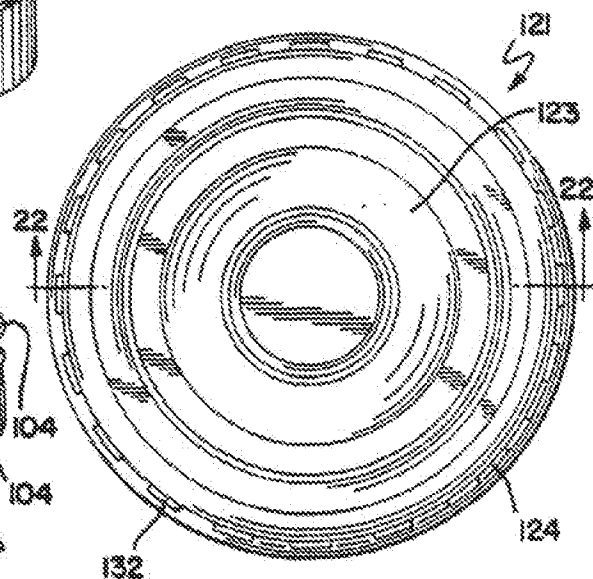


FIG. 23

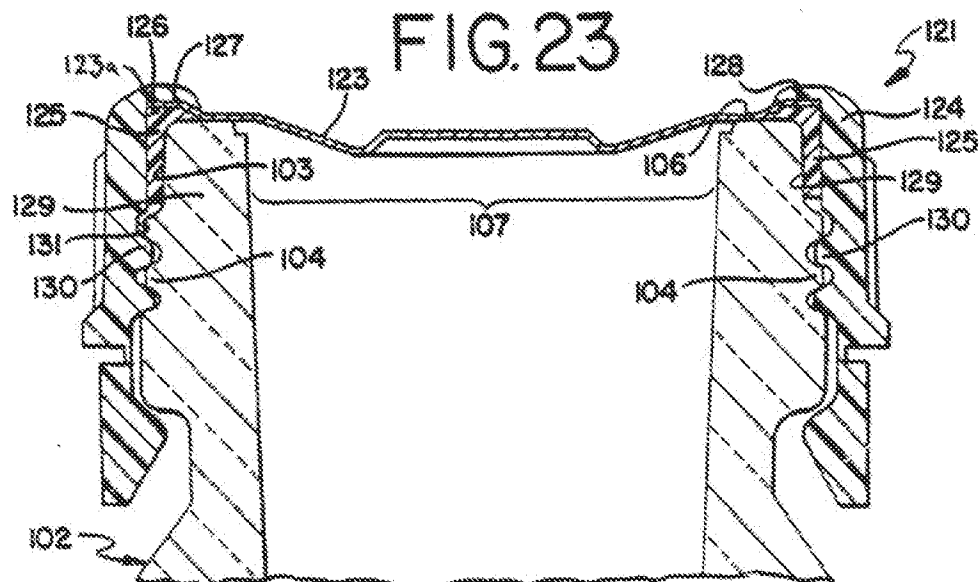


FIG. 24

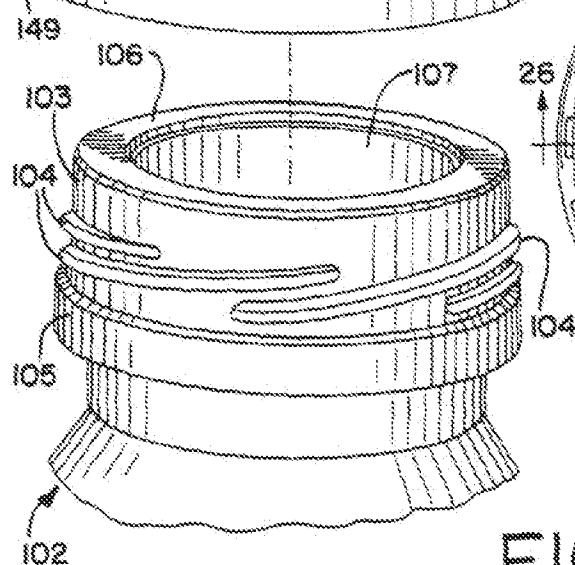
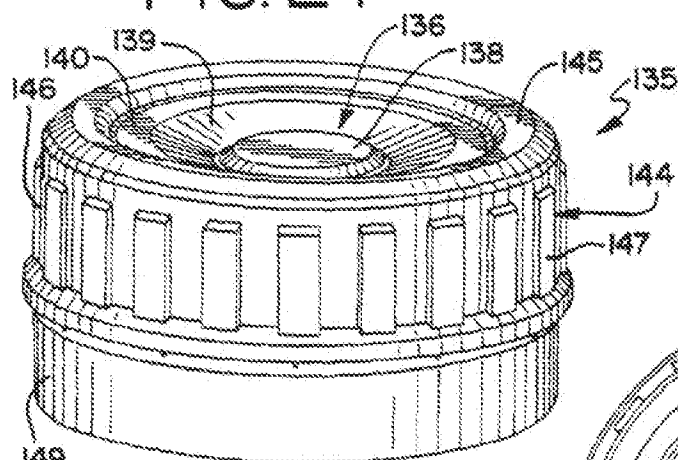


FIG. 25

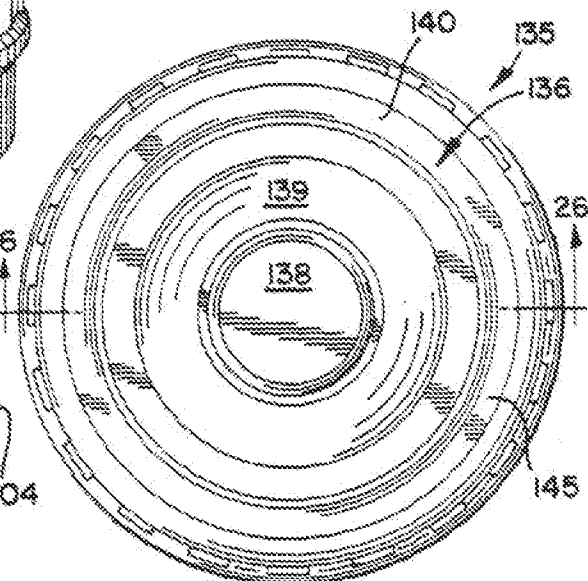


FIG. 26

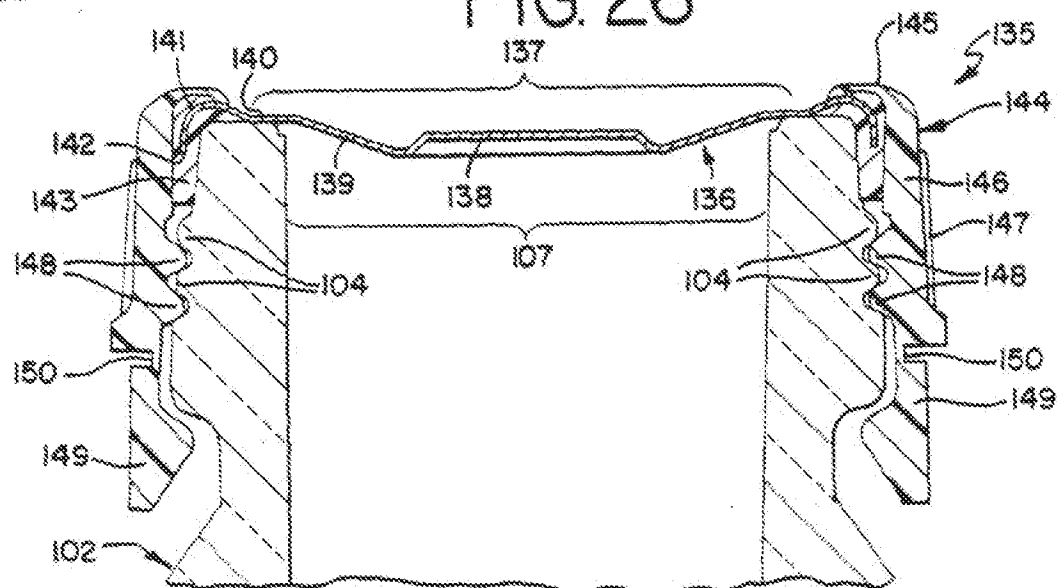


FIG. 27

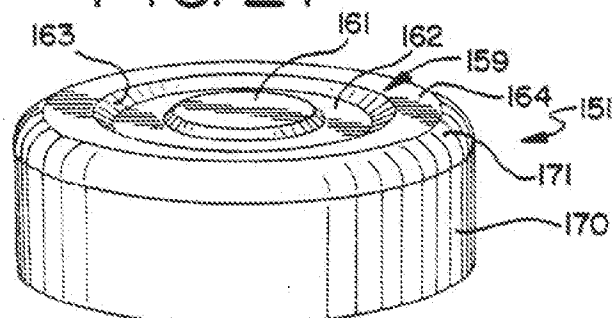


FIG. 28

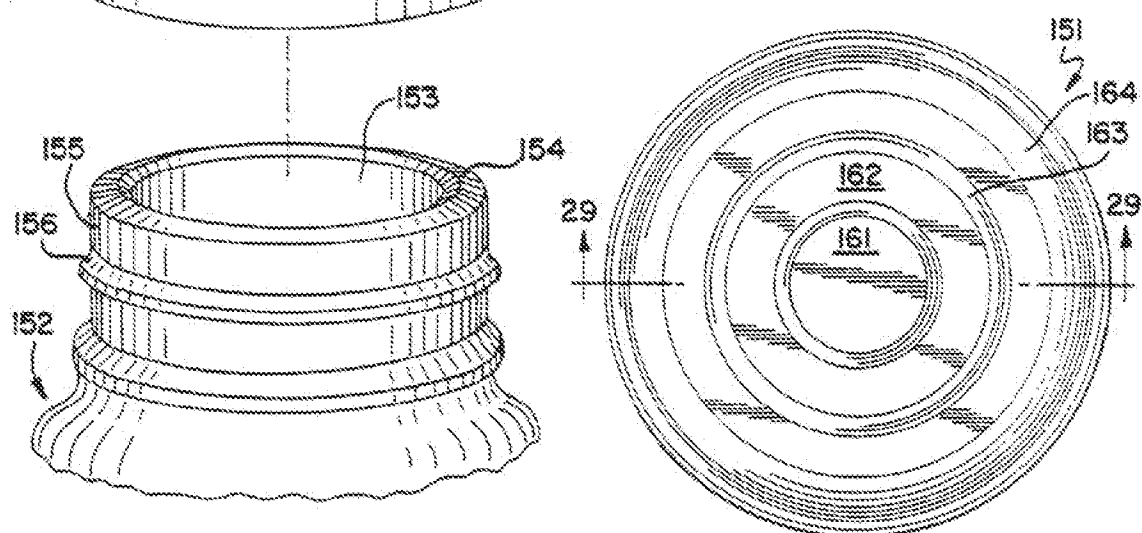


FIG. 29

